coats®

1250 Series Wheel Balancer

1250-3DV Shown

Service Manual and Troubleshooting Guide

READ these instructions before placing unit in service KEEP these and other materials delivered with the unit in a binder near the machine for ease of reference by supervisors and operators.

HENNESSY INDUSTRIES, INC.
1601 J. P. Hennessy Drive, LaVergne, TN USA 37086-3565 615/641-7533 800/688-6359 www.ammcoats.com
HENNESSY INDUSTRIES INC. Manufacturer of AMMCO®, COATS® and BADA® Automotive Service Equipment and Tools.
Manual Part No.: 8114353 02
Revision: 07/07

IMPORTANT SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS

1. Eye and face protection recommendations:

   "Protective eye and face equipment is required to be used where there is a reasonable probability of injury that can be prevented by the use of such equipment." O.S.H.A. 1910.133(a) Protective goggles, safety glasses, or a face shield must be provided by the owner and worn by the operator of the equipment. Care should be taken to see that all eye and face safety precautions are followed by the operator. ALWAYS WEAR SAFETY GLASSES. Everyday glasses only have impact resistant lenses, they are not safety glasses.

2. Do not disable hood safety interlock system, or in any way shortcut safety controls and operations.

3. Be sure that wheels are mounted properly, the hub nut engages the arbor for not less than four (4) turns, and the hub nut is firmly tightened before spinning the wheel.

4. Read and understand this manual before operating. Abuse and misuse will shorten the functional life.

5. Be sure the balancer is properly connected to the power supply and electrically grounded.

6. Do not operate equipment with a damaged cord or if the equipment has been dropped or damaged – until it has been examined and repaired by a qualified serviceman.

7. Do not let cord hang over edge of table, bench, or counter or come in contact with hot manifolds or moving fan blades.

8. If an extension cord is necessary, a cord with a current rating equal to or more than that of the equipment should be used. Cords rated for less current than the equipment may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.

9. Keep guards and safety features in place and in working order.

10. Wear proper clothing. Safety toe, non-slip footwear and protective hair covering to contain hair is recommended. Do not wear jewelry, loose clothing, neckties, or gloves when operating the balancer.

11. Keep work area clean and well lighted. Cluttered and/or dark areas invite accidents.

12. Avoid dangerous environments. Do not use power tools or electrical equipment in damp or wet locations, or expose them to rain.

13. Avoid unintentional starting. Be sure the balancer is turned off and power disconnected before servicing.

14. Disconnect the balancer before servicing.

15. Use only manufacturer's recommended accessories. Improper accessories may result in personal injury or property damage.

16. Repair or replace any part that is damaged or worn and that may cause unsafe balancer operation. Do not operate damaged equipment until it has been examined by a qualified service technician.

17. Never overload or stand on the weight tray or any part of the balancer.

18. Do not allow untrained persons to operate machinery.

19. To reduce the risk of fire, do not operate equipment in the vicinity of open containers or flammable liquids (gasoline).

20. Adequate ventilation should be provided when working on or operating internal combustion engines.

21. Keep hair, loose clothing, fingers, and all parts of body away from moving parts.

22. Use equipment only as described in this manual.

23. Use only manufacturer's recommended attachments and accessories.

SAVE THESE INSTRUCTIONS

Owner's Responsibility

To maintain machine and user safety, the responsibility of the owner is to read and follow these instructions:

- Follow all installation instructions.
- Make sure installation conforms to all applicable Local, State, and Federal Codes, Rules, and Regulations; such as State and Federal OSHA Regulations and Electrical Codes.
- Carefully check the unit for correct initial function.
- Read and follow the safety instructions. Keep them readily available for machine operators.
- Make certain all operators are properly trained, know how to safely and correctly operate the unit, and are properly supervised.
- Allow unit operation only with all parts in place and operating safely.
- Carefully inspect the unit on a regular basis and perform all maintenance as required.
- Service and maintain the unit only with authorized or approved replacement parts.
- Keep all instructions permanently with the unit and all decals/labels/notices on the unit clean and visible.
- Do not override safety features.

Operator Protective Equipment

Personal protective equipment helps make tire servicing safer. However, equipment does not take the place of safe operating practices. Always wear durable work clothing during tire service activity. Loose fitting clothing should be avoided. Tight fitting leather gloves are recommended to protect operator's hands when handling worn tires and wheels. Sturdy leather work shoes with steel toes and oil resistant soles should be used by tire service personnel to help prevent injury in typical shop activities. Eye protection is essential during tire service activity. Safety glasses with side shields, goggles, or face shields are acceptable. Back belts provide support during lifting activities and are also helpful in providing operator protection. Consideration should also be given to the use of hearing protection if tire service activity is performed in an enclosed area, or if noise levels are high.

Definitions of Hazard Levels

Identify the hazard levels used in this manual with the following definitions and signal words:

DANGER

Watch for this symbol:

It Means: Immediate hazards, which will result in severe personal injury or death.

WARNING

Watch for this symbol:

It Means: Hazards or unsafe practices, which could result in severe personal injury or death.

CAUTION

Watch for this symbol:

It Means: Hazards or unsafe practices, which may result in minor personal injury or product or property damage.

Watch for this symbol! It means BE ALERT! Your safety, or the safety of others, is involved!

Safety Notices and Decals

⚠ WARNING

Failure to follow danger, warning, and caution instructions may lead to serious personal injury or death to operator or bystander or damage to property. Do not operate this machine until you read and understand all the dangers, warnings and cautions in this manual. For additional copies of either, or further information, contact:

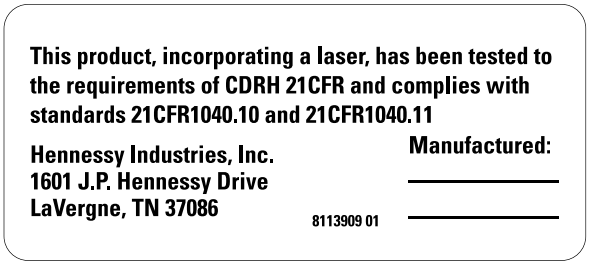
Hennessy Industries, Inc.
1601 J.P. Hennessy Drive
LaVergne, TN 37086-3565
(615) 641-7533 or (800) 688-6359
www.ammcoats.com

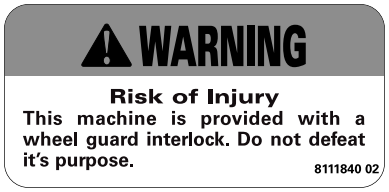
The motor unit of this machine contains a Class IIIa laser with a maximum output less than 5mW at a wave length of 650-670 nm. **Avoid Exposure - Laser radiation is emitted from its aperture.**

⚠ CAUTION

Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

In case of failure, the entire motor unit must be replaced.


This product, incorporating a laser, has been tested to the requirements of CDRH 21CFR and complies with standards 21CFR1040.10 and 21CFR1040.11
Hennessy Industries, Inc.
1601 J.P. Hennessy Drive
LaVergne, TN 37086
Manufactured:
8113909 01



WARNING
RISK OF EXPLOSION
This equipment has internal arcing or sparking parts which should not be exposed to flammable vapors. Do not locate in a recessed area or below floor level.
THIS EQUIPMENT MUST BE EARTH-GROUNDED
The earth-ground connector built into the power cord provides protection to reduce the risk of electrical shock.
CAUTION
Do not use below garage floor or grade level.
Disconnect power before servicing this equipment.
To prevent electrical shock, do not remove cover. No user servicable parts inside. Refer servicing to qualified service personnel.
May Be Protected by one or more of the following patents:
USA - 4,423,632 - 4,499,768 - 4,939,941 - 5,311,777 - 5,337,256
AUSTRALIA - 564038
OFF
ON
8113547 01

Standard Safety Devices

- Stop key for stopping the wheel under emergency conditions.
- A hood guard of high impact plastic that is designed to prevent the counterweights from flying out in any direction except towards the floor.
- A hood switch interlock system that prevents the machine from starting if the guard is not lowered and stops the wheel whenever the guard is raised.

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Servicing

Service should be performed only by COATS® trained and authorized Service Technicians. The troubleshooting and service procedures in this manual are arranged to allow rapid and thorough service. The steps are PRELIMINARY INSPECTION, FUNCTIONAL CHECKS, REPAIR OF FAILURE, REPLACEMENT or ADJUSTMENT, and FUNCTIONAL CHECKS. Identification of replacement parts required can be accomplished by using the parts identification manual for this unit.

It is important that the functional checks be performed in sequence and the problem isolated prior to attempting any adjustments or replacements. Do not assume anything. If an adjustment or replacement is made, all functional checks must be performed successfully before the balancer can be considered available for service.

Required Tools

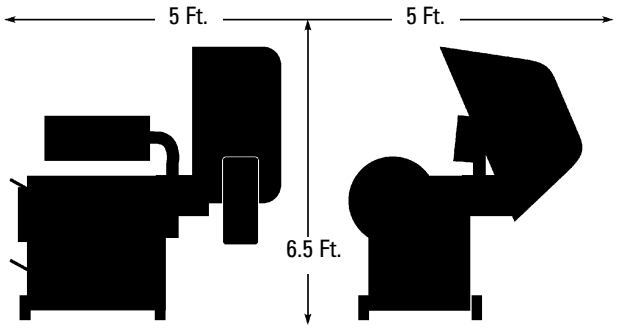
- AC - DC / Volt - Ohm meter.
- Test Wheel - Domestic 14", 15", or 16" x 6" steel wheel with a center hole suitable for mounting with a back cone. A new tire properly mounted and inflated, balanced to within 0.05 ounces should be part of this wheel assembly. The lateral run out of this wheel should be less than 1/8".
- Typical Mechanic's and electrician's tools.
- Thread locking anaerobic (Loctite 242 or equivalent).
- Retaining compound (Loctite 601 or equivalent).
- Dial indicator (run-out gauge) AMMCO No. 929752 or equivalent.
- Modeling Clay.
- 4-ounce or 100-gram calibration weight
- Static discharge wrist strap to ground device. **Failure to wear this when handling, testing, or replacing any of the PCBs in this balancer may result in damage to a PCB which Hennessy Industries, Inc. is not responsible for.**

Installation & Set Up

- A factory trained COATS® Service Technician must perform the install, setup, and initial test procedures on this 1250 balancer.
- Read the Operating Manual for this unit.
- Be sure you completely understand and comply with all of the Receiving, Installation, Set Up, Connecting to Power, and Initial Testing instructions.
- Be sure to perform the "Preliminary Inspection" and "Operational Check" described in this manual.
- If necessary, perform any functional checks required.

Floor and Space Requirements

- The balancer must be located on a flat floor of solid construction, preferably concrete.
- The balancer must sit solidly on its 3 feet.
- If the balancer is not level, does not sit solidly on its 3 feet, or is placed on an unstable floor, the balancer will not function properly and will produce inaccurate balance readings.
- The balancer is not designed to be bolted down, nor will it function properly if left on the pallet.
- Select a location for the balancer that provides a level, solid floor, and adequate clearance around and above the balancer.



- Make sure the location selected has enough room above and behind the unit so the hood can be raised completely.
- The location must also provide working room for mounting and removing wheels.

Unpack and Setup

1. Inspect the carton and pallet for damage. Take pictures if damaged.

2. Move the pallet as close as possible to the working location of the balancer.

3. Remove the carton from the pallet.

4. Inspect the contents for hidden damage. Take pictures if damaged.

5. Remove the Safety Guard (Hood), literature packet, skin pack(s), and any accessories shipped with the balancer.

6. Unbolt the balancer from the pallet.

7. Carefully remove the balancer from the pallet and position it in its working location.

⚠ CAUTION

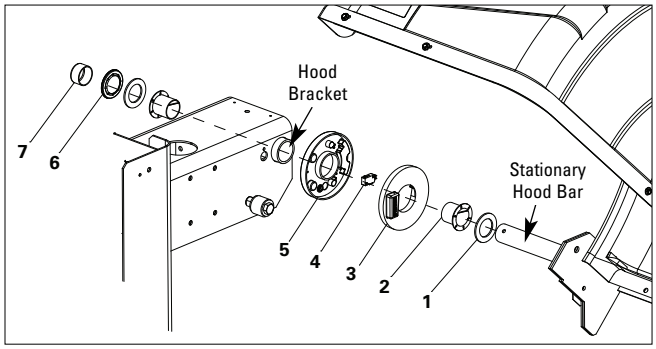
Do not use the control pod, control pod arm, faceplate, hood or stub shaft to lift the balancer. Use help to remove the balancer from the pallet. The unit is heavy and the weight is not evenly distributed. Dropping the unit may cause personal injury or equipment damage.

Safety Guard (Hood) Installation

1. Locate the hood assembly hardware and hood spring.

2. Locate the hood assembly.

3. Slide one hood bar washer and one flanged bearing onto the stationary hood bar; flange to cam.



ITEM		DESCRIPTION
1	8109944	Hood Bar Washer
2	8307014	Flanged Nylon Bearing
3	8113332	Hood Switch Cam/Cover
4	8113334	Limit Switch
5	8113333	Hood Switch Housing
6	8109945	1-1/2" Retainer Washer
7	8109949	Hood Bar Cap

4. Install the hood assembly into the hood bracket. Be sure the hood bracket properly engages the switch assembly.

5. Slide the other flanged bearing and the other hood bar washer into position followed by the 1-1/2" retainer washer and hood bar cap.

7. Raise the hood all the way and verify that the hood stop bracket on the side of the hood contacts the rubber hood stop solidly.

8. Lower the hood and verify that the other end of the hood stop bracket contacts the rubber hood stop solidly.

9. Raise the hood and hold it up.

⚠ CAUTION

Use help to hold the hood while attaching the hood spring. Attaching the spring without holding the hood in place may cause it to snap open suddenly, resulting in personal injury.

10. Hook one end of the hood spring under the back of balancer chassis in line with the pin on the hood stop bracket.

11. Hook the other end of the spring over the pin in the rear of the hood stop bracket. Make sure the spring fits into the groove in the pin.

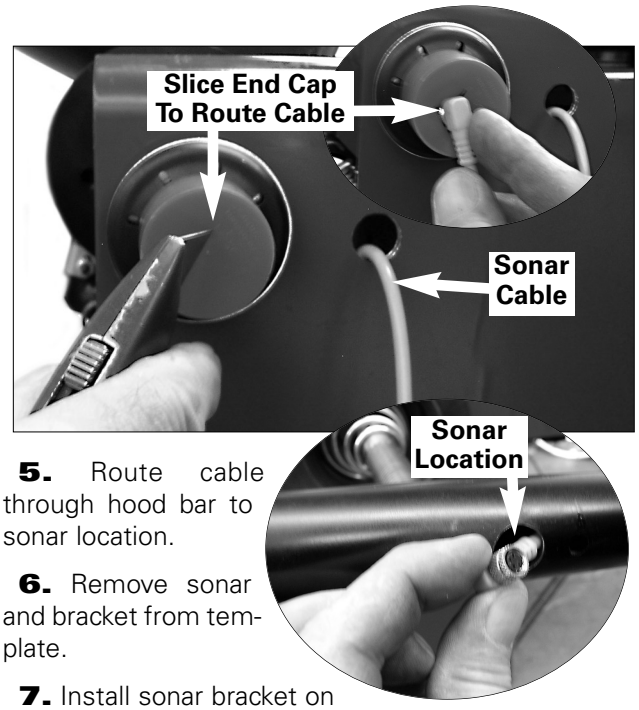
Sonar (Width) Installation

1. Install hood assembly onto the balancer.

2. Next, remove hood from the hood bar.

3. Uncoil sonar cable located at back of balancer.

4. Now slice an X in the end cap, see below.

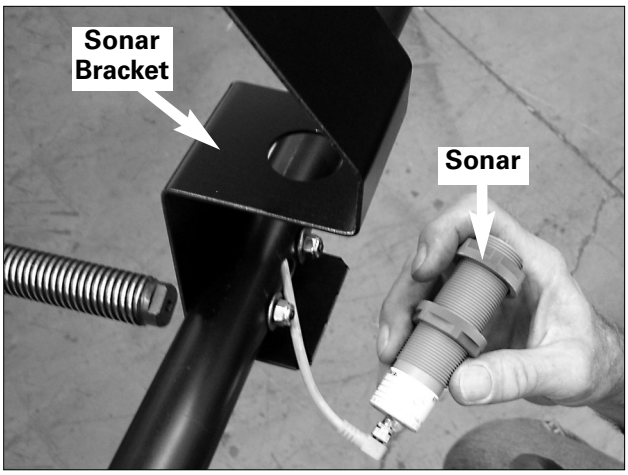


5. Route cable through hood bar to sonar location.

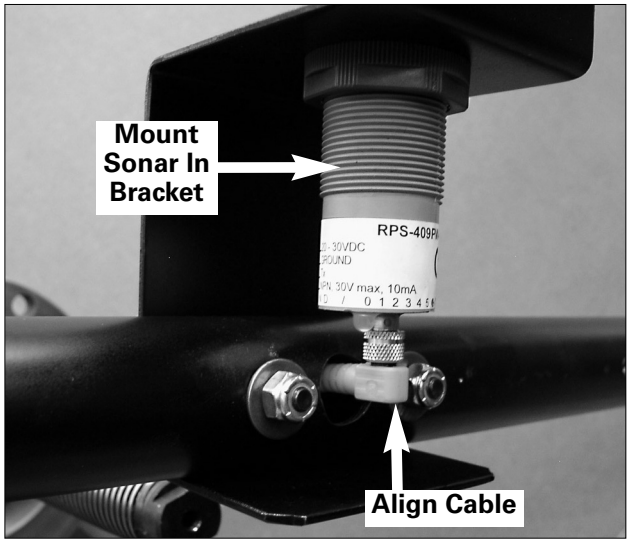
6. Remove sonar and bracket from template.

7. Install sonar bracket on hood bar with hardware provided.

8. Attach cable to sonar.



9. Mount sonar in bracket, aligning cable to hole in hood bar.



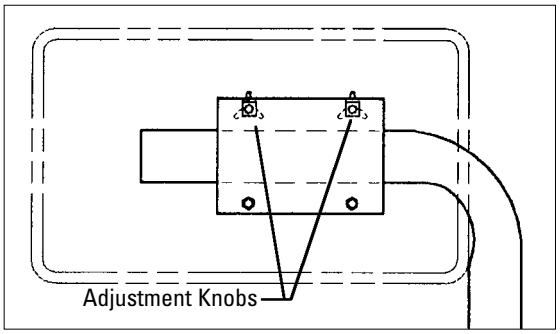
10. Replace hood onto hood bar.

Control Pod Set Up

1. Use a 1/2-inch wrench/socket to loosen the four Nyloc nuts that secure the u-bolts to the support bracket and raise the control pod support arm. Raise it high enough to allow room for the pod to rotate into position.

2. Lightly tighten the control pod support arm retainer nuts on the side of the support bracket. (Arm will be adjusted and tightened later.)

3. Loosen the two adjustment knobs on the back of the control pod.



4. Rotate the pod into operating position, and retighten the knobs.

5. Loosen the nuts on the support arm retainers.

6. Raise or lower the control pod into the desired position, and tighten the retainer nuts enough to secure the pod but allow the arm to be pivoted.

Operation

See the Operator's Manual for this unit. Be sure you completely understand all of the functions and features of the wheel balancer.

End User Training

1. Begin by having the end user do a typical two clip-on weight dynamic balance. This should make the end user comfortable with the balancer because it operates like most other computer wheel balancers and the operator is immediately successful.

2. Then demonstrate all of the touch panel functions like operator A & B, Round off, etc.

3. Demonstrate and have the operator do a tape-a-weight balance using the laser for T2. Be sure he understands that the more accurately he matches the arm line laser position to the laser point position, the more successful he will be on the check spin. Also, that the laser must stop blinking before placing the weight at the laser point of light on the wheel.

4. Instruct the end user on a "behind the spoke" T2 balance.

5. Instruct the end user on the match mount procedure.

6. Have the end user do a 4-ounce calibration following the instructions on the display and emphasize how critical correct weight amount & placement are during calibration and when balancing any wheel. Explain why the A & W dimensions may change slightly during calibration on this particular balancer.

7. Emphasize that the balancer only needs calibration if it begins to consistently chase weights. It does not need to be calibrated very often.

8. Instruct the end user on why proper wheel mounting is so critical.

9. Instruct the end user on all standard and optional accessories shipped with the unit.

10. Instruct the end user on proper balancer and adapter maintenance.

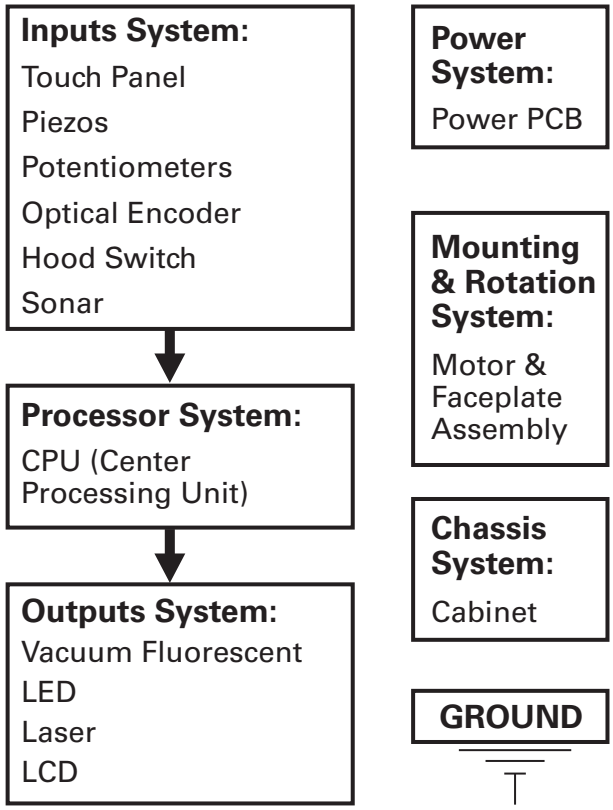
11. Address specific shop issues that may affect operation of the unit.

12. Review all documentation enclosed with the unit (Operator's Manual, Warranty information etc.).

Balancer Description

A computerized wheel balancer is a specialized computer system. A computer has a system of inputting information, processing the information, and displaying the input and the output (results). Of course electronics need a power system. A wheel balancer also requires a system to make a wheel rotate simulating the centering of the wheel and its plane of rotation on the vehicle.

Computer Balancer System Diagram



Power System

The balancer is typically configured to be powered by a 220 VAC, 15 Amp, 3 Phase or 220 VAC, 15 Amp, Single Phase source. If the balancer is Single Phase, a capacitor pack is required. If the balancer is 3 Phase, a jumper plug is used. Power goes to the Power PCB (Printed Circuit Board) sometimes called the Motor Controller Board. Power is controlled and routed through this board to the 220 VAC components like the Motor and the Motor Cooling Fan. The Power PCB has an integral transformer to step down the voltage to 6.5 VAC as required by other components. This 6.5 VAC is supplied to and powers the Processor PCB. The Power PCB has two non replaceable fuses to prevent the board from literally burning if it fails. The Processor PCB supplies power to other components like the Display PCB. The Processor PCB has its own integral rectifier to convert the AC voltage to DC voltage for those components that require direct current.

Input System

The input system supplies the required information to the processor that is needed to calculate the correct weight amounts and locations to display for wheel balancing. It also supplies the information to select the options for the displays. In addition, it supplies the signals for the safety interlock and to start and stop the balancing cycle.

Touch Panel

The Touch Panel is equipped with pressure sensitive switches that allow manual input of wheel dimensions and selection of desired functions.

Optical Encoder

The optical encoder delivers signals to the processor that provide rotational information. From these signals the processor can calculate rotational speed and wheel locations. It consists of a rotary shutter attached to the motor shaft with 64 open windows that allow an optical signal through with a single window at a different diameter on the wheel that identifies a complete revolution (360 degrees). The processor calculates 256 positions (including zero) for the wheel. This results in very accurate weight placement of 1.4 degrees of resolution.

A & D Potentiometers

There are two potentiometers connected to the A & D arm. When the arm is pulled out in the "Distance" plane the A potentiometer value (voltage) changes. When the arm is rotated in the "Diameter" plane the value (voltage) for the D potentiometer changes. This information tells the processor where the inside weight will be placed and where T2 will be placed when using that location.

Piezos

The three piezos between the motor and the chassis, each measure the amount of imbalance in the wheel. When pressure is applied to a piezo it generates a voltage. When pressure is applied in the opposite direction a voltage of the opposite polarity is generated. This is called an AC voltage. If more pressure is applied you get a larger AC signal. When a wheel rotates, the piezos generate an AC signal proportional to the pressure applied. (The larger the imbalance in the tire/wheel assembly, the larger the signal generated.)

Safety Guard (Hood) Switch

Two switches make up the safety interlock system. They send signals to the processor that allow it to know if the hood is in the up position or down position and prevent the motor from getting power to spin when the hood is up.

Processor System

The actual CPU (Central Processing Unit) is mounted on the Processor PCB along with the necessary components to convert analog signals to digital signals and back.

Note: Processor PCB revision H and backward will only drive 1250s. Revision I and forward will drive both 1250 and 1250 3DV.

Display Panel

The display PCB is part of the Touch Panel assembly located in the Pod and displays weight amounts, weight locations, service codes, and indicates active functions using LEDs. A Vacuum Fluorescent Display with its own PCB is used to communicate messages, instructions, error codes, and wheel dimensions etc. and is labeled the "Information Box.

Lasers

When weight location T2 is activated, a laser displays a red dot for use on the inside of the wheel to indicate T2 weight location. A manually operated line laser is used to precisely match the A2 dimension to the desired weight location plane.

Wheel Mounting & Drive System

A 220 Volt Motor with 220 Volt Cooling Fan provides direct rotation of the balancer shaft. (220 Volt single phase units use a capacitor.) The motor shaft is the balancer shaft and extends trough the balancer faceplate. A threaded shaft screws into the balancer shaft to provide a means of securing the wheel/tire assembly to the unit. Various mounting adapters (cones, pin plates, hub nuts etc.) are available individually and in sets to mount the wheel/tire assembly in a manner to accurately simulate its centering and plane of rotation on the vehicle.

Chassis System

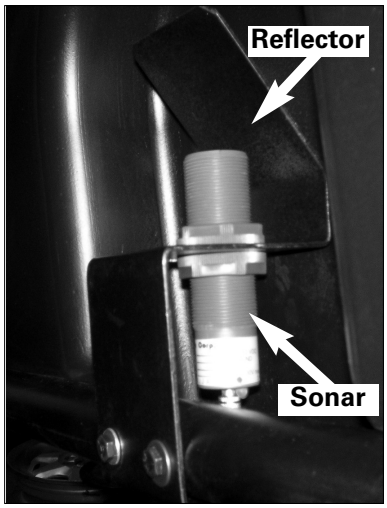
The chassis system consists of the balancer cabinet with safety guard/pod bracket, Weight Tray and Shield, processor PCB Cover, motor cover gasket & shield, safety guard (hood) assembly and display pod assembly. The chassis contains a ?? pound sack of rock that serves as ballast so the balancer does not have to be bolted to the floor.

3DV Differences

3DV Unique Functionality

Auto Width Entry

The main functional difference between the 1250 and the 1250 3DV is the use of a hood mounted sonar unit for automatic width entry.



When the C2 weight location is selected and after entering A & D dimensions, when the hood is lowered, the sonar reading is used to calculate W dimension.

The W dimension will not be calculated again until the C2 location is exited and chosen again or the A & D dimensions are re-entered.

In other words, the W dimension is not calculated every time the hood is lowered.

For diagnostic purposes, you can use Command Code 75 to toggle between normal operation and width sonar calculations every time the hood is closed.

Sonar Calibration

The width sonar is self calibrating and calibration is performed every time a 4 ounce calibration is performed. Remember that the balancer's computer calculates the true A dimension during the 4 ounce calibration.

If a sonar unit is replaced, a 4 ounce calibration must be performed before balancer is returned to service.

If automatic width readings are inaccurate, perform a 4 ounce calibration and then an A & D Arm calibration. (This assumes all the components involved are good.)

3DV Unique Components

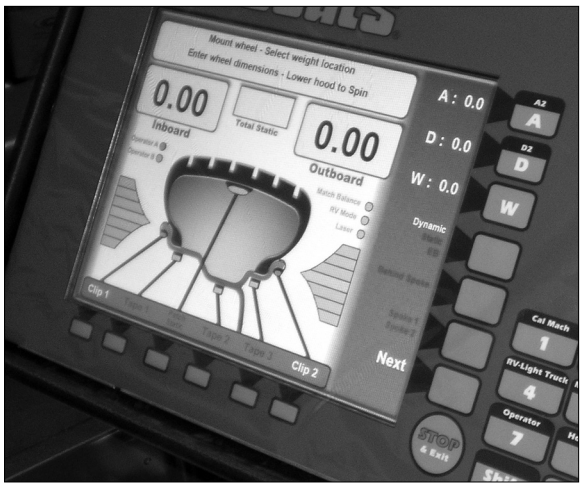
Width Sonar

The width sonar, mounted to the hood bar, generates a sound wave signal that bounces off a metal reflector. It then bounces off the tire sidewall back to the reflector and back to the sonar. This dimension along with the A dimension is then used to calculate rim width.

Touch Panel / Display Assembly

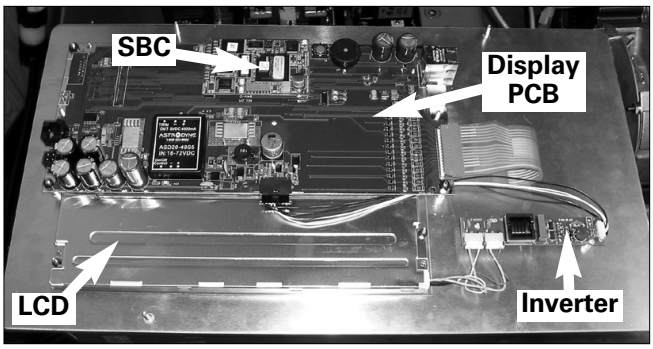
LCD - The 1250 3DV display features a liquid crystal display (LCD) panel. This eliminates the need for the LED display and Vacuum Fluorescent Display found on the 1250.

The Information Box, Weight Amount and Location Indicators, Mode Selection Indicators, and Weight Location Indicators all appear on the LCD panel.



The LCD is protected by a sheet of thin Lexan in front of the panel.

Display PCB - The display PCB is different from that used on the 1250.



The fluorescent backlight in the LCD requires a power supply mounted on the back of the touch panel. The inverter connects to the display PCB. This inverter produces 3,000 Volts. It will blow its fuse if you ground it via your body and it will need to be replaced.

The 1250 3DV has a single board computer (SBC) to supply the additional computing capability to drive the LCD panel and the animated graphics it displays.

The Single Board Computer (SBC) PCB is "piggy-backed" onto the display PCB and can be replaced without replacing the main PCB.

The display PCB plugs directly into the back of the LCD, no cable.

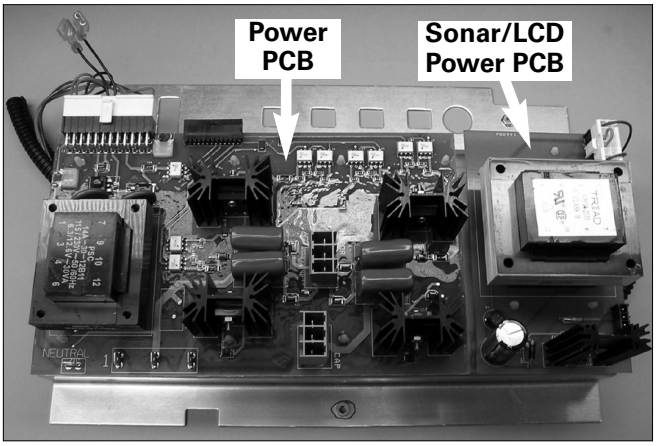
Touch Panel

The touch panel switches are relocated to match with the information locations as shown on the LCD panel.

Extra care must be taken when removing or installing the touch panel assembly. The LCD has a glass front which may break if the assembly is flexed during removal or installation.

Power Panel

Sonar/LCD Power PCB - The sonar and LCD panel require additional power. This takes the form of a second PCB mounted next to the regular Power PCB on a longer mounting plate.



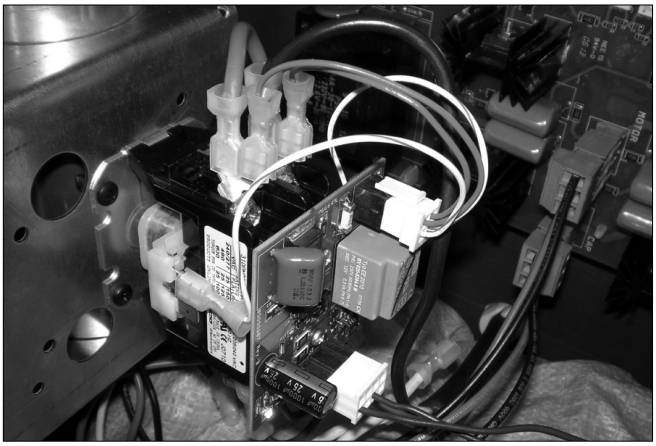
Pod

The 3DV has a deeper Pod to accommodate the additional depth of the Pod components.

Processor PCB

The 3DV processor PCB (revisions I and up) have been modified but are backward compatible to the 1250. However, the 1250 processor PCB (revision H and back) are not forward compatible to the 3DV.

Motor Protection Relay



The 1250V is equipped with a motor protection relay. If the motor temperature reaches about 150 degrees Centigrade, the balancer power circuit is opened for about 4.5 minutes to allow the motor to cool down. At that time, the balancer power will be restored by the circuit automatically closing. The power cord connects to the relay contactor instead of directly to the power PCB. A temperature sensor is used in the motor and is connected to the relay printed circuit board. The contactor/ PCB assembly is attached to a capacitor pack bracket.

On three phase units, the capacitor pack bracket is used without the capacitors and a 3 pole contactor is used to enable connection of the white wire in the power cord.

Two red LEDs on the lower left corner of the PCB blink in the following patterns:

Slow Alternating Blinking: Indicates open power circuit (as when motor is cooling down and power is interrupted or computer is booting up)

Faster Alternating Blinking: Indicates closed power circuit (normal operation)

Simultaneous Blinking: Indicates open power circuit (motor temperature exceeds limit)

Diagnostics & Troubleshooting

Preliminary Inspection

1. Check the power supply to the balancer. Unplug the Balancer from the power source. Perform all voltage checks shown in the appropriate diagram and chart at the power receptacle. If one or all voltage measurements is faulty be sure to check the status of the circuit breakers that supply the Balancer. Check from one of the power terminals to the ground terminal to verify a ground is present. The voltage measurement should be approximately one half of the available voltage (i.e. 220V should read 110V). If the reading is less that one half of the available voltage, there is not a ground present. Normal acceptable deviation is plus and minus 10%, damage can occur when voltage or amperage is beyond 10% design specs.

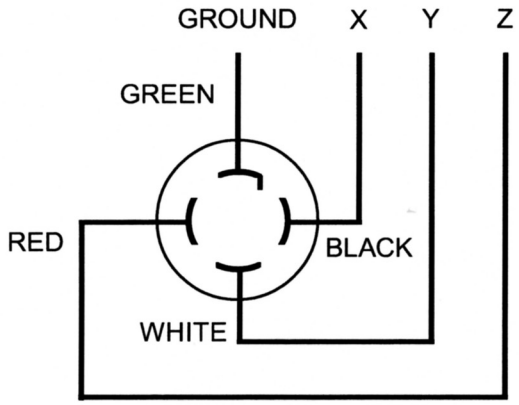
Note: If any faults are found in the above procedure, it is the responsibility of the owner. COATS® authorized service personnel are not responsible for wiring within the building. Consult a licensed electrical contractor for proper installation to local electrical codes. Power outlets must be enclosed in a floor raceway or overhead drop if pedestrian or equipment traffic can damage power cord.

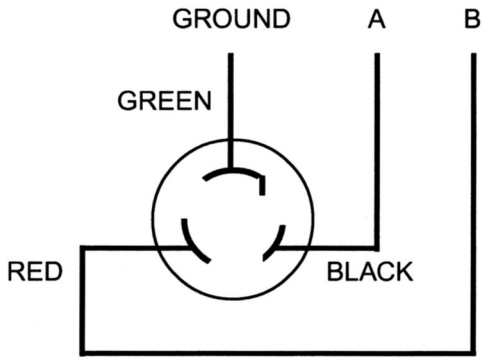
2. Plug the balancer into its power source. Use an ohmmeter to check the resistance between the frame of the Balancer and the building ground. The resistance should be less than 1 ohm. If the resistance measurement is greater that one (1) ohm, check the power plug and frame connection for proper contact.

⚠ CAUTION

Operation with a defective ground circuit will create a shock hazard for the operator and could damage the balance's electronics. Operation with a defective ground circuit may void warranty.

3. The Balancer should sit on all three (3) legs. Make sure the legs have not filled with dirt, wheel weights, or other foreign matter that may prevent a leg from making contact with the floor.





THREE PHASE VOLTAGE REQUIREMENTS / INFORMATION

	208V/220V/230V	380V	460V
X - Y	195-250	370-420	420-480
X - Z	195-250	370-420	420-480
Y - Z	195-250	370-420	420-480
Plug Installed	Hubbell 2421	Hubbell 2431	
Required Mating Outlet	Hubbell 2420 or Equivalent	Hubbell 2430 or Equivalent	

SINGLE PHASE VOLTAGE REQUIREMENTS/ INFORMATION

	208V/220V/230V
A - B	195 - 250
Plug Installed	NEMA L6-20P
Required Mating Outlet	NEMA L6-20R

4. The floor should be a solid flat surface that does not allow the balancer legs to set into a recess in the floor or sink into the floor itself.

5. Inspect cones, hub nut, pressure cup(s), and threaded stud for damage. Missing cones or accessories should be replaced.

Functional Checks

Functional checks are used to determine if the balance's components are adjusted, calibrated, and/or functioning correctly. They should not be performed until AFTER the preliminary inspection has been completed.

Operation Check

1. Mount a Test Wheel on the balancer.

2. With the balancer set up to do a two clip-on weight dynamic balance ("Clip" 1 & "Clip" 2 weight locations), proceed to balance the wheel.

3. If the wheel does not "zero" on the check spin in round off mode, proceed to do a repeatability check and a calibration check.

Repeatability Check

1. Put the balancer in non round off (fine) mode.

2. Cycle the balancer.

3. Note the readings for each plane.

4. Cycle the balancer five (5) more times and note the readings after each cycle.

5. Each planes readings should stay within plus or minus 0.10-ounces of its original reading. If not, perform the piezo check.

Calibration Checks

Calibration checks are used to verify that the balancer is calibrated.

4-ounce Amount & Location (Accuracy Check):

1. Balance a hub centric steel wheel to 0.03-ounces or lower per side in the fine balance (non-round off) mode.

2. Place a 4-ounce weight on the outside wheel flange.

3. Cycle the balancer.

4. Readings should be:

LEFT PLANE - 0.00 plus or minus 0.12-ounces

RIGHT PLANE - 4.00 plus or minus 0.12-ounces

RIGHT POSITION FLASHING - 4.00-ounce weight at Bottom Dead Center plus or minus 0.50-inches.

5. Move the 4.00-ounce weight to the inside wheel flange.

6. Cycle the balancer.

7. Readings should be:

RIGHT PLANE - 0.00 plus or minus 0.12-ounces

LEFT PLANE - 4.00 plus or minus 0.12-ounces

LEFT POSITION FLASHING - 4.00-ounce weight at Bottom Dead Center plus or minus 0.50-inches.

8. If above parameters are not met, perform a 4-ounce (100-gram) calibration. (See Operator's Manual, Calibration Section in this manual or use Instructions on display.)

A & D Dimensions:

1. Touch the A & D arm to the rim at the clip-on weight location (C1).

2. Note the dimensions on the display.

3. Verify the dimensions by reading the A dimension on the gauge rod scale and the D dimension on the tire sidewall.

4. If automatic A dimension is not plus or minus 0.2 of the scale reading, perform the arm calibration. If the D dimension is not plus or minus 0.25-inches of the dimension on the tire sidewall, perform the arm calibration. (See appropriate Calibration section in this manual.)

Rotational Check (Mounting)

The rotational check is used to verify the wheel is mounted correctly and the adapters, balancer face plate, and shaft are not damaged.

1. Balance a hub centric steel wheel to 0.05-ounces or less per side in the fine balance (non-round off) mode.

2. Position the valve stem at 12:00.

3. Loosen hub nut just enough to allow the wheel to move.

4. While holding the faceplate so it cannot turn, rotate the wheel 90 degrees relative to the faceplate (valve stem at 3:00).

5. Tighten hub nut.

6. Press START. New weight readings should be 0.30 oz. or less.

7. Repeat steps 3 through 6. at 180 degrees (valve stem at 6:00) and 270 degrees (valve stem at 9:00). Weight readings should be .30 oz. or less.

If the weight readings exceed 0.30-ounces in either plane in any of the positions:

1. Remove the wheel from the balancer.

2. Inspect the mounting contact points of the wheel, the balancer adapters used for mounting, the balancer shaft, and the balancer faceplate for damage (nicks, burrs, rust etc.). Repair or replace as necessary.

3. Dial indicate the balancer's face plate. It should have 0.001-inch or less run-out. Replace motor/face plate assembly if necessary. (See appropriate section of "Repair & Replacement Procedures" in this manual.)

4. Dial indicate the balance's face plate shaft (non-threaded shaft). It should have 0.001-inch or less run-out. Replace motor/face plate assembly if necessary. (See appropriate section of "Repair & Replacement Procedures" in this manual.)

5. If face plate & shaft are good, dial indicate the balancer cone that was used for mounting the wheel while it is on the smooth portion of the balancer shaft. It should have 0.002-inch or less run-out. Replace the cone if necessary.

Potentiometer Check

1. Depress "Shift 0" then enter code "19" to bypass 4-ounce calibration and access the A & D arm calibration.

2. Depress and hold the "Shift" key while you depress the number "3" key (Cal Arm).

3. Depress "96"

4. Do not perform the calibration.

5. The LEFT PLANE Weight display now shows voltages for the distance potentiometer and the RIGHT PLANE Weight display shows voltages for the Diameter potentiometer.

6. With the arm in the home position, each reading should be between 0.400 and 0.700. If this is not the case, adjust the potentiometers as described in the "Adjustments" Section of this manual.

7. Move the arm as if you were measuring a wheel.

8. Each of these voltages should increase as the arm is moved from the home position and return to the original readings when the arm is returned home.

9. If this is the case, the potentiometers are functioning properly.

10. Depress the "Stop/End" key to exit this mode without performing an Arm calibration.

11. If the readings are present but do not act as described above, perform a physical inspection of the potentiometers to be sure they are not loose or damaged and that their wiring and connections are good. If they are loose, refer to the "Potentiometer" "Adjustments" section in this manual.

12. If there is no voltage reading in either of the displays, perform a physical inspection as described above and then perform the checks described in the appropriate section of "Power/Signal Systems Checks" in this manual.

Piezo Check

This check is to verify consistency of piezo outputs.

1. Mount a balanced steel test wheel on the balancer and enter the dimensions.

2. Attach a 4-ounce weight on the wheel's outer rim.

3. Cycle the balancer.

4. Depress and hold the "Shift" key then depress the "0" key. "CdE" appears in the "LEFT PLANE" weight display.

5. Depress the "5" key then the "4" key. (Code 54) "54" appears in the RIGHT PLANE weight display.

6. Write down the values in the Information Box for "L Mag" and for "L Angle".

7. Depress the "Next" key and write down the values for "RFMag and for "RFAngle".

8. Depress the "Next" key and write down the values for "RRMag" and for "RRAngle"

9. Depress the "Next" key to exit the code mode.

10. Depress the "Start" key and cycle the balancer.

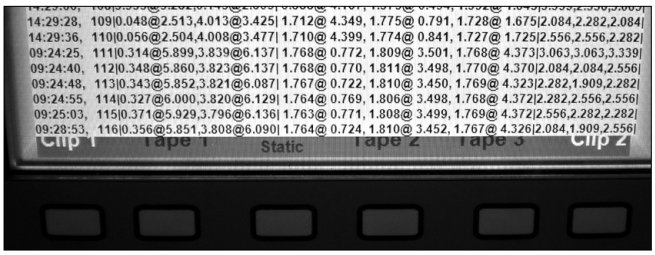
11. Repeat the process of writing down the readings for a total of 5 cycles.

12. "Mag" and "Angle" readings should not vary by more than 0.0500 for a specific piezo.

Example (values may be different depending on wheel size used):

Cycle	L Mag	L Angle	RFMag	RFAngle	RRMag	RRAngle
1	3.7835	5.0438	3.4221	1.4457	3.3996	2.3454
2	3.8118	5.0542	3.4567	1.45	3.4361	2.355
2	3.8109	5.0578	3.4589	1.4571	3.4384	2.3592
4	3.8074	5.0593	3.4573	1.4581	3.4375	2.3614
5	3.8056	5.06	3.4608	1.4588	3.4378	2.3625
Variation = Largest Value minus Smallest Value	0.0283	0.0162	0.0387	0.0131	0.0382	0.0171

13. If the variation is greater than 0.0500, perform a physical inspection of the piezo spring height adjustment, piezo wiring and connections and then perform the checks described in the appropriate section of "Power/Signal Systems Checks" in this manual.



Note: Alternative method for 3DV model piezo check: follow steps 1 & 2 above; cycle the balancer five times; then access the event log (shift 0, 45). The piezo magnitude and angle for the last five spins will be displayed at the bottom of the screen for comparison. Permitted variation is still 0.0500.

Optical Encoder Check

1. Depress and hold the "Shift" key while you depress the "0" key. "CdE" appears in the "LEFT PLANE" weight display.

2. Depress the "4" key two times. (Code 44). With the first push the number "4" appears in the RIGHT PLACE weight display. With the second push the encoder count appears in the "RIGHT PLANE" weight display.

3. Slowly rotate the wheel a full revolution while watching the display. The count should go from 0 to 255 without missing a value and then start over.

4. If the count skips numbers or is missing a section of numbers or a signal does not appear, perform a physical inspection of the encoder wiring and connections and then perform the checks described in the appropriate section of "Power/Signal Systems Checks" in this manual.

Touch Panel Check

To check the pressure sensitive switches (keys):

1. Depress and hold the "Shift" key while you depress the "0" key. "CdE" appears in the "LEFT PLANE" weight display.

2. Depress the number "4" key and then the number "2" key. (Code 42) "42" will appear in the RIGHT PLANE weight display.

3. Now when each pressure sensitive switch is depressed, except for the "Shift" key, a character will appear in the Vacuum Fluorescent Display/Information Box as shown in the following table.

4. Depress each key to see if it is functioning.

5. Depress and hold the "Shift" key while you depress the "0" key to exit this mode. As you do this the Vacuum Fluorescent Display/Information Box will briefly display "Shift" "0" before returning to normal displays.

6. If any of the switches are inoperative, replace the touch panel. (See appropriate section of "Repair & Replacement Procedures" in this manual.)

Switch (key) Description	Displayed Charater
Clip 1	C
T1-Tape	T
Patch Static	H
T2-Tape	E
T3-Tape	P
Clip 2	I
Dynamic/Static	Y
Behind Spoke	B
Spoke 1/Spoke 2	K
Stop & Exit	X
A	A
D	D
W	W
Next	N
1/Cal Mach	1
2/Cal Laser	2
3/Cal Arm	3
4/RV-Lite Truck	4
5/Tire Match	5
6/Round Off	6
7/ Operator A/B	7
8	8
9/Ounce/Gram	9
0	0
Shift	(none)
Start/Total Static	S

Pressure Switch Table

LEDs Check

To check the LEDs:

1. Depress and hold the "Shift" key while you depress the "0" key. "CdE" appears in the "LEFT PLANE" weight display.

2. Depress the number "4" key and then the number "3" key. (Code 43)

3. All LEDs will light. **(Those in the position displays will only remain on if the balancer shaft does not rotate.)**

4. Depress the "Next" key or the "Stop/Exit" key to leave the check mode.

5. If any of the LEDs do not light, replace the Display PCB. (See appropriate section of "Repair & Replacement Procedures" in this manual.

Vacuum Fluorescent Display Check

The Vacuum Fluorescent Display will either show information or not.

If not, perform a physical inspection of the PCB wiring and connections and then perform the checks described in the appropriate section of "Power/Signal Systems Checks" in this manual.

LCD (3DV) Functional Check

The LCD will have either an easily seen image, a very faint image, or no image.

An easily seen image is an indication of proper operation.

A very faint image is an indication of a failed DC-AC Inverter or LCD Back Light.

Assuming the power and signal paths have checked as functional up to the LCD Panel, no image is an indication of a failed LCD Panel.

Laser Check

⚠ CAUTION

Follow all of the Laser safety instructions and cautions in the "Safety Instructions" section of this manual.

1. With a test wheel mounted on the balancer, depress the "Direct Select Weight" key "T2-Tape" This will activate the laser.

2. Turn the knurled knob on the laser assembly to position the "dot" on the interior of the test wheel if it is not already there. The laser "dot" should be in focus.

3. It will be blinking if the "Right Plane" weight position is other than 12:00. When the "Right Plane" weight position is precisely at 12:00, the laser will stop blinking and have a steady "dot".

4. If the Laser does not come on, perform a physical inspection of the Laser wiring and connections and then perform the checks described in the appropriate section of "Power/Signal Systems Checks" in this manual.

5. If the Laser is not in focus, perform the procedures described in the appropriate section of "Adjustments" in this manual.

Sonar Check (3DV) Functional Check

With a test wheel mounted on the balancer, start a new balancing cycle by using the A & D arm to enter its dimensions.

Close the hood to start a spin cycle.

The W dimension should appear on the display.

If not, perform a physical inspection of the Sonar components.

If no fault is found, then perform the procedures described in the appropriate section of "Power/Signal System Checks" in this manual. (If necessary, refer to the 3DV schematic in the reference section of this manual.)

Power/Signal Systems Checks

Always perform the related "Functional Check" before performing the Power/Signal System Check.

When performing any of the power/signal systems checks, always follow all of the safety procedures and observe all of the cautions found in this manual.

Power Source

Perform steps 1 and 2 of "Preliminary Inspection" found in "Diagnostics & Troubleshooting section.

Power Cord and Plug

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Use a Volt/Ohm meter to check the black and red wires from the power cord to the Power PCB spade terminals as described in the "Power PCB Test Points and Connectors" table and illustration in the "Wiring" section of this manual.

4. If no voltage is present, check the power cord and plug for continuity.

5. If continuity is not found, repair or replace the faulty part. (See "Replacement Procedures" section of this manual.)

Motor Protection Relay

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual.

2. Verify that the Plug and Power Cord are good.

3. If power is reaching relay, red LEDs will be blinking.

4. If not, replace the PCB/Contactor assembly.

5. Functional check the balancer.

Power PCB

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual.

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual. (The voltage check in this verification assures power is flowing to the Power PCB.)

3. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

4. Remember that power is still flowing to Power PCB and On/Off Switch when the balancer is plugged in. (Even if the power switch is in the off position.)

5. Use a Volt/Ohm meter to perform all of the power out and fuse checks as described in the "Power PCB Test Points and Connectors" table and illustration in the "Wiring" section of this manual.

6. If any of required voltages are not found or if fuses are blown (no continuity), replace Power PCB. (See "Replacement Procedures" section of this manual.)

Sonar/LCD Power PCB (3DV) Power System Signal Check

Verify that the power source is good as described in the "Preliminary Inspection" section of this manual.

Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual. (The voltage check in this verification assures power is flowing to the Power PCB.)

Remove the Weight Tray and Shield. (See the "Replacement Procedures" section of this manual.)

Remember that power is still flowing to the Power PCB and the On/Off Switch when the balancer is plugged in. (Even if the power switch is in the off position.)

Verify that the Power PCB (Motor Controller Board) is good as described in the Power/Signal Systems Checks" section of this manual.

Each red wire from the Power PCB to the Sonar/LCD Power PCB should read 110 Volts to chassis ground, 220 Volts across. (REFER TO THE 3DV WIRING SCHEMATIC IN THE REFERENCE SECTION OF THIS MANUAL.) These wires provide the power to the PCB.

The red and black to the processor PCB are red 24 volts DC Black ground.

The wires going to the Display PCB are unregulated and should read from 19 volts DC to 36 volts DC between the Natural and Red as well as between the Red and Black.

DC-AC Inverter (3DV) Power System Signal Check

Verify power is good from the power source (outlet) all the way to the display PCB. (Refer to the appropriate information in this manual.)

The two black wires (pins one & two) from the Display PCB should each be 12 volts DC across either of the two white wires which are ground. (REFER TO THE 3DV WIRING SCHEMATIC IN THE REFERENCE SECTION OF THIS MANUAL.)

Outgoing from inverter to the LCD is 3,000 volts AC.

⚠ CAUTION

Most volt-ohm meters DO NOT measure in the 3,000 volt range.

If the inverter is getting power but the LCD is only displaying a very faint image, it is most likely that the inverter has failed and needs to be replaced.

The other possibility is LCD back light failure.

On/Off Switch

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

3. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

4. Unplug the balancer from the power source. (Power is still flowing to the Power PCB and the On/Off Switch when the balancer is plugged in.)

5. Remove the Weight Tray and Shield. (See appropriate section in "Replacement" section of this manual.)

6. Remove the black wires from the spade terminals on the power switch.

7. Check the switch for continuity as described in the "Power PCB Test Points and Connectors" table and illustration in the "Wiring" section of this manual.

8. If the switch fails the continuity test in either the on or off position, replace the switch. (See "Replacement Procedures" section of this manual.)

Processor PCB

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

3. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Unplug the balancer from the power source.

6. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

7. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

8. Plug in the balancer and turn the power switch on.

9. Check test points T1 & T2 as described in the "Processor PCB Test Points table and illustration in the "Wiring" section of this manual.

10. If T1 and T2 fail, **unplug the balancer**, then remove and check the power supply cable to the connector between T1 and T 2 for continuity.

11. If the cable fails the continuity test, replace the cable.

12. Plug in the balancer and turn the power switch on.

13. Mount a test wheel on the balancer, enter the dimensions, and cycle it once.

14. Use a Volt/Ohm meter to check test points T3 through T8 as described in the "Processor PCB Test Points table and illustration in the "Wiring" section of this manual.

15. If any of the test points fail, replace the Processor PCB. (See "Replacement Procedures" section of this manual.)

Piezos

1. Perform the functional check described in this manual.

2. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

3. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

7. Unplug the balancer from the power source.

8. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

9. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

10. Plug in the balancer and turn the power switch on.

11. Check test points T11, T12, & T13 as described in the "Processor PCB Test Points table and illustration in the "Wiring" section of this manual.

12. If any of the required voltages are not present, inspect the piezo connector and wiring.

13. If good, replace the piezos. (See necessary "Replacement Procedures" sections of this manual.)

Potentiometers

1. Perform the functional check described in this manual.

2. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

3. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

7. Unplug the balancer from the power source.

8. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

9. Check the potentiometer connector and wires.

10. If the all of the above are good, replace the potentiometers. (Remember they are replaced as a set with cable on this unit. See necessary "Replacement Procedures" sections of this manual and the necessary "Adjustments" section of this manual.)

Optical Encoder

1. Perform the functional check described in this manual.

2. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

3. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

7. Unplug the balancer from the power source.

8. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

9. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

10. Plug in the balancer and turn the power switch on.

11. Check test point T16 as described in the "Processor PCB Test Points table and illustration in the "Wiring" section of this manual.

12. Check the encoder connectors and wires.

13. Check to be sure the encoder disc is secured to its shaft and clean.

14. If the all of the above are good, replace the encoder. (Remember they are replaced as a set with cable on this unit. See necessary "Replacement Procedures" sections of this manual and the necessary "Adjustments" section of this manual.)

Safety Guard (Hood) Switches

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

3. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Unplug the balancer from the power source.

7. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

8. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

9. Disconnect the Safety Guard Hood Switch Connector from the Processor PCB.

10. Plug in the balancer and turn the power switch on.

11. Mount a test wheel & tire and enter A, D, and W dimensions.

12. Press start.

13. If the wheel cycles, **unplug the balancer** and check the cable and switches for continuity. (See the illustration in the "Reference Materials" section of this manual.)

14. Identify the failed component(s) and repair or replace it/them. (Note that if the cable is replaced, it must be routed from inside the balancer to the switch assembly. See the necessary "Replacement Procedures" sections of this manual.)

15. Connect the switch cable connector to the Processor PCB.

16. Plug in the balancer.

17. Perform the appropriate functional checks.

18. Unplug the balancer and re-assemble it.

Laser

1. Perform the functional checks described in this manual.

2. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

3. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

7. Unplug the balancer from the power source.

8. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

9. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

10. Inspect the laser connector and wiring.

11. If good, replace the laser sub-assembly. (See Parts Identification manual for this unit. See the necessary "Replacement Procedures" sections of this manual.)

12. Re-assemble, plug in the balancer, and perform the necessary functional checks. (Adjust the laser focus if necessary.)

Sonar (3DV) Power System Signal Check

1. Perform the functional check described in this manual.

2. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

3. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the Sonar Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

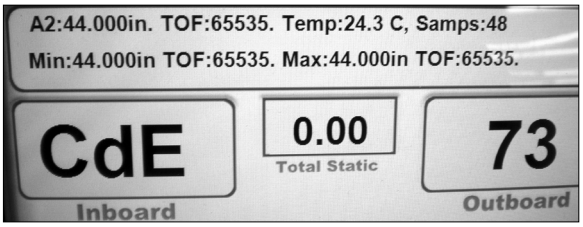
7. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

8. Verify that all of the sonar power and signal cables are securely connected.

9. Plug in and turn on the balancer.

10. With the hood up, enter Command Code "Shift 0, 73". This turns the sonar on for continuous readings and displays them in the information box on the LCD.

11. With the hood up and nothing in front of the sonar reflector, it should display 44 inches and a "TOF" (Time of Flight) of 65535.



12. Ignore the Temperature reading. (It probably will not agree with the current ambient temperature. This is O.K. as long it is calibrated.)

13. Place a smooth, opaque, flat object (like a clipboard) in front of the sonar reflector and watch the display for a change in values for inches and TOF.

14. If no initial display is given or if it fails to change, replace the sonar. (See appropriate "Replacement Procedures" sections of this manual.)

Important: Always read and follow the information box instructions.

Touch/Display Panel

1. Perform the functional checks described in this manual.

2. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

3. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual (same for Sonar/Display Power PCB on 3DV).

5. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

7. Unplug the balancer from the power source.

8. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

9. Remove the Touch/Display Panel from the pod. (See "Replacement Procedures" section of this manual.)

10. Refer to the "Processor PCB Connections" and "Touch/Display Panel Connections" sections in the "Wiring" section of this manual and check all of the connectors and cables for a positive connection and for continuity.

11. If all of the above tests are good, replace the malfunctioning component(s) Touch Panel, Display PCB, and/or Vacuum Fluorescent Display PCB. (3DV: single board computer SBC, PCB, DC-AC Inverter PCB and/or LCD; see necessary "Replacement Procedures" sections of this manual).

Capacitors

Usually a symptom of capacitor failure is when the motor doesn't spin but hums or gets up to speed with a helping push.

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

3. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Verify that the Motor is good as described in the "Power/Signal Systems Checks" section of this manual.

7. Unplug the balancer from the power source.

8. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

9. Check the capacitor connection to the Power PCB.

10. If all of the above checks are good, replace the capacitor pack. See necessary "Replacement Procedures" sections of this manual.)

Fan

The fan starts a 30 minute run cycle each time the balancer is powered up or each time the balancer initiates a spin cycle.

The fan can be turned on and off manually by using the appropriate "extended Command Code". Either "Shift 0" "24" to turn it on or "Shift 0" "25" to turn it off.

If the fan does not run as described above:

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

3. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Unplug the balancer from the power source.

7. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

8. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

9. Check the connector and wires from the Power PCB to the fan.

10. If all of the above are good, replace the fan. (See necessary "Replacement Procedures" sections of this manual.)

Motor

1. Verify that the power source is good as described in the "Preliminary Inspection" section of this manual

2. Verify that the Power Cord and Plug are good as described in the "Power/Signal Systems Checks" section of this manual.

3. Verify that the Power PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

4. Verify that the On/Off Switch is good as described in the "Power/Signal Systems Checks" section of this manual.

5. Verify that the Processor PCB is good as described in the "Power/Signal Systems Checks" section of this manual.

6. Unplug the balancer from the power source.

7. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

8. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

9. Check test point T14/T15 as described in the "Processor PCB Test Points table and illustration in the "Wiring" section of this manual.

10. If the spin signal is present at the Processor PCB, check the wiring connections to the motor from the Power PCB and the continuity of the wires.

11. If all of the above are good, replace the motor assembly. (See necessary "Replacement Procedures" sections of this manual.)

Reference Materials

Command Codes

1250 / 1250 3DV "Shift" Command Codes		
Depress and hold the "Shift" key		
Depress		
0		Initiates acceptance of extended command codes
1	"Cal Mach"	Initiates 4-ounce calibration procedure
2	"Laser"	Initiates dot laser calibration as additional step to 4-ounce calibration (Only necessary after replacing processor PCB, Motor, and/or dot laser bracket.)
3	"Cal Arm"	Initiates Arm calibration procedure
4	"RV-Lite Truck"	Toggles to 0.50 ounce round off
5	"Match Balance"	Initiates match balancing procedure
6	"Round Off"	Toggles weight amount display between round off and fine balance (1/4 ounce round off or hundredths of an ounce display)
7	"Operator A/B"	Toggles between wheel dimensions and values for either operator A or operator B
8	"Hood Start"	Toggles "Hood Start" on or off
9	"Ounce/Gram"	Toggles weight amount display between units in ounces or grams
Extended Command Codes		
After Depressing "Shift" "0" ("CdE" appears in Left Plane weight amount display)		
Depress		
10	Cal A&D Arm	Same as shift 3
14	Set Date & Time	Used to set date & time when processor board is assembled. Calendar/Clock is used to date/time stamp events entering memory. Reset should only be required if battery falls out or fails.
15	Show Date & Time	Used to show date & time of processor board
19	Bypass 4-ounce Cal	Used to bypass 4-ounce calibration and proceed to Arm Calibration to see A & D potentiometer values in weight display (Do NOT perform Arm calibration without dong 4-ounce cal libration first)
20	Toggle stop on top	Turns stop-on-top feature on & off
23	Toggle Laser	Turns laser on & off
24	Toggle Fan	On (for 30 minutes) or off
40	Show Revision	Shows software revision
42	Test Keypad	Each key, when depressed, displays a unique character on the vacuum fluorescent display in the "Information Box". (See pressure switch table for characters.)
43	Test Display	Lights all of the LEDs on the display PCB (**3DV** simulates lighted LEDs.)
44	Show Encoder Count	Displays the optical encoder count from 0-255 in the right plane weight display

Command Codes (Cont.)

45	Dump Event Log	Shows data from approximately 50 of the last spins from oldest to newest. (1250: Depressing "Next" gives one at a time advance of these readings and depressing "Shift" "Next" goes back one at a time. Depressing "Start" skips forward about 11 readings at a time. Depressing "Stop/Exit" or reaching most current spin data exits this mode.) **See "Reference Materials" section of manual for keys to 1250 & 3DV data sequences.**
47	Show Spin Count, Cal count, & Arm Cal count	Displays spin count, calibration count, & arm calibration count in "Information Box"
49	Upload new firmware	Can load new display board firmware versions via a the USB port and a "memory stick" that was loaded from the HNY Document Library on the internet. (Cannot use for new processor firmware at this time.)
52	Show Cal High Speed	Shows numbers stored during high speed calibration routine in "Information Box"
53	Show Cal Low Speed	Shows numbers stored during low speed calibration routine in "Information Box"
54	Show last piezo values	Raw reading from piezos. Use to check for bad piezo, if piezos are wired correctly, and value from last spin: peak magnitude and phase
55	Show Arm Cal	Shows arm calibration values
61	Scroll VFD or LCD brightness	Allows cycling through brightness levels on VFD display, 1250 or LCD display on 3DV.
65	Set Admin Access	PASSWORD is 69. Allows access to restricted extended command codes **highlighted in gray**. Example: noise filtering codes 86 through 89.
67	Adjust EB dynamic limit	Allows changing dynamic imbalance limit in EB mode.
71	Toggle EB mode	Toggles access to operator of EB mode. On non-EB 1250s a PIN will be required to enable access to the feature and this is achieved by using codes 76, 77, & 78. Note that all 3DV models come with it enables but toggled off by default.
72	Detect Sonar	Turns on sonar. Example: after replacing processor PCB. (MUST be turned on before attempting calibration.)
73	Show Sonar diagnostic information	Shows Distance reading in inches, TOF (time of flight) number, and Celsius temperature. Ignore temperature. It may not agree with current ambient temperature. This is O.K. as long it is calibrated.
74	Run graphics demonstration	Starts looped program of balancer operations on LCD display.
75	Toggle when to load W dimension from Sonar	Toggles between loading the W dimension with every hood closure or only on the first close after A & D dimensions have been entered. Default setting is only after A & D has been entered. (Every hood closure loading is only necessary for diagnostic reasons.)
76	Enter Balancer Serial Number	Used to enable EB mode on 1250s after customer purchase of EB mode feature.
77	Enter Processor Board Serial Number	Used to enable EB mode on 1250s after customer purchase of EB mode feature.
78	Enter Feature Key	Used to enable EB mode on 1250s after customer purchase of EB mode feature.
80	Load baseline calibration	Loads baseline 4 ounce calibration into volatile memory. Reverts to last calibration values if shut off.
81	Load baseline A & D calibration	Loads baseline A & D calibration into volatile memory. Reverts to last calibration values if shut off.
82	Write baseline calibration	Writes current 4 ounce calibration values to non-volatile memory.
83	Write baseline A & D calibration	Writes current A & D calibration values to non-volatile memory storage.
84	Clear calibration	Clears 4 ounce baseline calibration values from non-volatile memory.
85	Clear A & D calibration	Clears A & D baseline calibration values from non-volatile memory.
86	Ignore noise error	Used to fine tune noise filter settings if code 94 does not solve problem. Contact RSM for usage.
87	Noise error mode	Used to fine tune noise filter settings if code 94 does not solve problem. Contact RSM for usage.
88	Noise error limit	Used to fine tune noise filter settings if code 94 does not solve problem. Contact RSM for usage.
89	Shift counter set to 0 to use floating decimal	Used to fine tune noise filter settings if code 94 does not solve problem. Contact RSM for usage.
90	Restore production defaults to noise filter	Adjusts noise filter settings to production.
91	Adjust float tolerance	Allows setting rqnge for floating decimal option chosen using code 89. Contact RSM for usage.
94	Set to High Noise defaults	Adjusts noise filter to settings found successful in most high noise environments.
99	Reset Counters	Resets all counters

Failure Mode / Possible Cause(s) / Verification Test(s) / Solution(s)

Failure Modes	Possible Cause(s)	Verification Test(s)	Solution(s)
Does not light up	Balancer is not plugged in	Check if balancer is plugged in	Plug in balancer
	Power Source Breaker is open	Check breaker	Reset breaker
	Outlet	Use Volt-Ohm Meter to check outlet	Have end user get outlet repaired
	Plug	Check for correct wiring, loose connection, continuity	Repair or replace plug
	Power Cord	Check for correct wiring, loose connection, continuity	Repair or replace cord
	Motor Protection Relay		See Power/System Signal Checks
	On/Off Switch	Check for correct wiring, loose connection, continuity	Repair or replace switch
	Connector	Check connections	Re-establish connection or repair or replace connector
	Wire	Check continuity	Repair or replace cable
	Power PCB	See Power/System Signal Checks for Power PCB in this manual	Replace Power PCB
	Processor PCB	See Power/System Signal Checks for Processor PCB in this manual	Replace Processor PCB
	Display Panel PCB	See Power/System Signal Checks for Display Panel PCB in this manual	Replace Display Panel PCB
	Vacuum Fluorescent Display PCB	See Power/System Signal Checks for Vacuum Fluorescent Display PCB in this manual	Replace Vacuum Fluorescent Display PCB
Chases Weights (Does not return Zeros on check spin)	Technician is not positioning weights exactly	Watch technician balance several wheels	Train technician
	Not calibrated	See Calibration Checks in this manual (Amount/Position & Arm)	Calibrate balancer
	Piezos	See Piezo Checks in this manual	Adjust or replace piezos
	Potentiometers	See Potentiometer Check in this manual	Replace potentiometers
	Optical Encoder	See Optical Encoder Check in this manual	Replace Optical Encoder
Will Not Spin (assuming balancer lights up)	Power PCB	See Power/System Signal Checks for Power PCB in this manual	Replace Power PCB
	Processor PCB	See Power/System Signal Checks for Processor PCB in this manual	Replace Processor PCB
	Safety Guard (Hood) Switches and cable	See Powe/System Signal Checks for Safety Guard (Hood) in this manual	Repair or replace Saftey Guard (Hood) switches
	Motor connections & wires	Check connections & continuity	Repair or replace faulty component
	Motor	See Power/System Signal Checks for Motor in this manual	Replace Motor
	Capacitor (220 Volt single phase)	See Power/System Signal Checks for Capacitor in this manual	Replace Capacitor
Will Not Brake	Power PCB	See Power/System Signal Checks for Power PCB in this manual	Replace Power PCB
	Processor PCB	See Power/System Signal Checks for Processor PCB in this manual	Replace Processor PCB
	Optical Encoder	See Optical Encoder Check in this manual	Replace Optical Encoder

Error Codes

1250 Error Codes	
Code #	Message - Suggested Action(s)
E1	SPIN UP IS TOO SLOW - Verify power supply to balancer & power connection.
E2	SPIN UP TIME TOO LONG - Check wheel diameter and power supply. Depress "Stop/Exit"
E3	NO ROTATION SIGNAL - Check motor, Power PCB, encoder & wiring (probably encoder if balancer spins, probably power PCB if does not spin). Depress "Stop/Exit"
E4	WHEEL ROTATION DIRECTION IS REVERSED - Disconnect power & correct wiring.
E5	"STOP TIME TOO LONG - Verify power supply & motor connection. Depress "Stop/Exit"
E6	ENCODER IS NOT CONNECTED OR HAS FAILED - Test for encoder prescence. Disconnect power supply and repair or replace.
E9	WHEEL COAST SPEED IS TOO SLOW - Light tire or mechanical problem in motor (bearings).
E10	CORRECT SEQUENCE NOT FOLLOWED DURING ARM CALIBRATION - Recalibration required.
E23	EEPROM READ ERROR -
E24	LOWER HOOD TO SPIN -
E25	LOOSE HUB NUT - Tighten hub nut and spin.
E26	CAL ERROR - Repeat 4-ounce calibration
E27	"UNDEFINED -

1250 Processor PCB Compatibility Matrix

1250 Processor PCB Compatibility Matrix		
PCB 8113907 Revsion	Model 1250	Model 1250 3DV
H and backward	X	
I and forward	X	X

1250 Spin History Data Key

If you access about the last 50 spin cycles on a 1250 by entering "Shift" "0" CDE 45 (Dump Event Log), you will see a display as follows in the "Information Box".

Example Display: 00,02:13:42:37,A,2.765,3.063,2.556

00 is the record number (00 is the most recent spin, 33 would be 33 spins ago etc)

The next four fields are the time that the spin was recorded

02 is the day of the month

13 is the hour

42 is min

37 is seconds

A is operator (either A or B)

2.765 is the left amplifier gain

3.063 is the right front amplifier gain

2.556 is the right rear amplifier gain

Note: Amplifier gain readings are inversely related to the piezo outputs. (The smaller the piezo output the larger the gain.) A maximum gain reading of 11.800 would indicate a disconnected, broken, or shorted piezo wire or a bad piezo.

3DV Spin History Data Key

If you access about the last 50 spin cycles on a 1250 by entering "Shift" "0" CDE 45 (Dump Event Log), you will see a display as follows on the LCD.

Example Display:

13:13:36 is Time

82 is Spin count

0.236 is Inner weight magnitude

0.154 is Inner weight angle (in radians)

3.866 is Outer weight magnitude

0.243 is Outer weight angle

1.667 is Left piezo magnitude

1.230 is Left piezo angle

1.733 is Right Front piezo magnitude

3.953 is Right Front piezo angle

1.696 is Right Rear piezo magnitude

4.838 is Right Rear piezo angle

2.556 is Left piezo gain

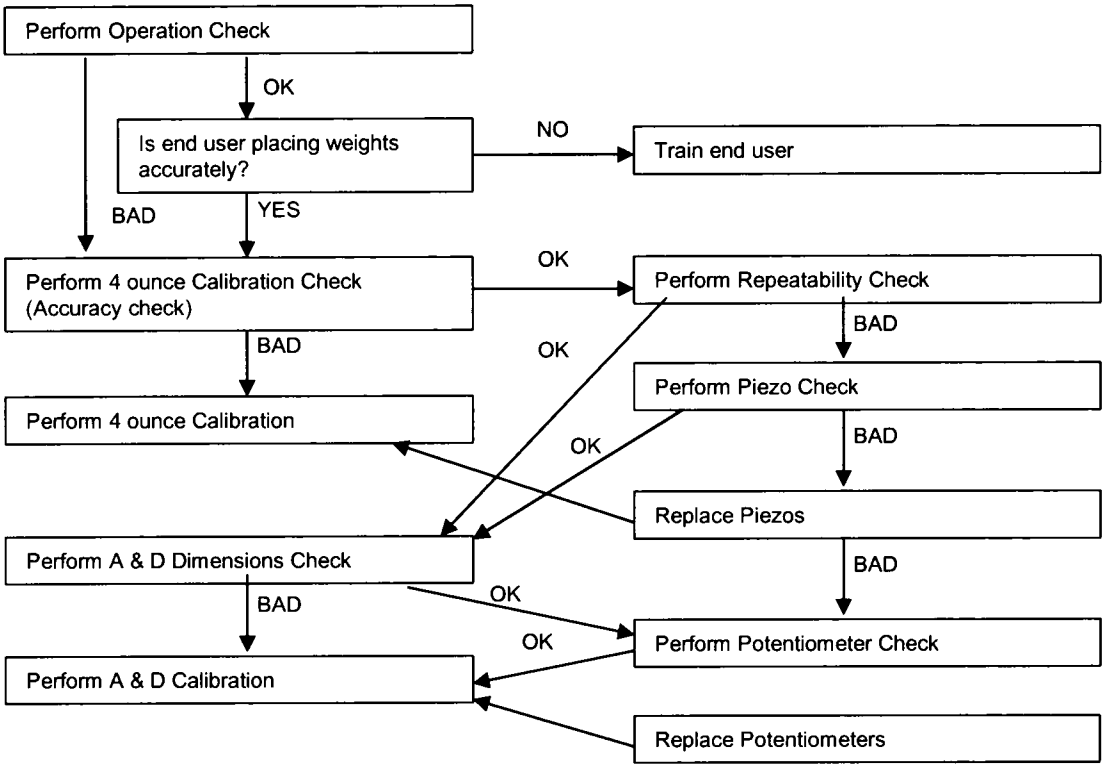
2.556 is Right Front piezo gain

2.282 is Right Rear piezo gain

Note: Amplifier gain readings are inversely related to the piezo outputs. (The smaller the piezo output the larger the gain.) A maximum gain reading of 11.800 would indicate a disconnected, broken, or shorted piezo wire or a bad piezo.

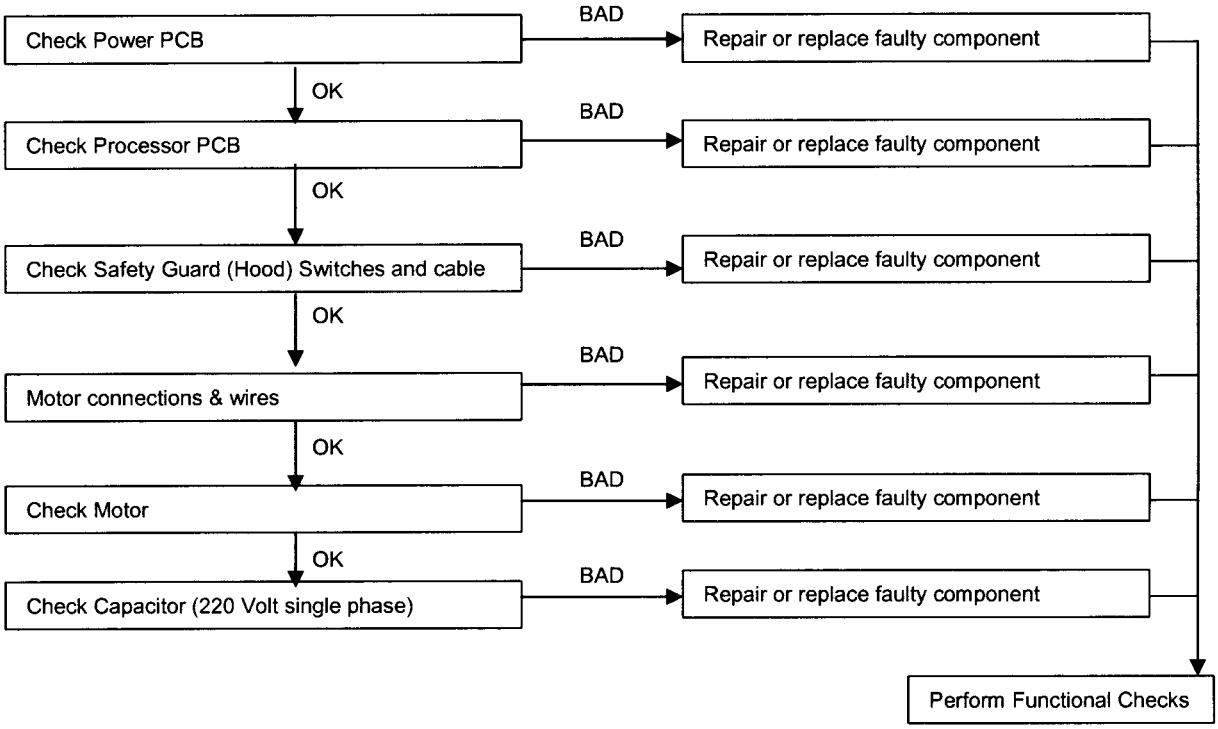
Diagnostic Flow Charts

Balancer "Chases Weights" (Does not return zero on check spin)



Balancer "Will Not Spin", "Does Light Up"

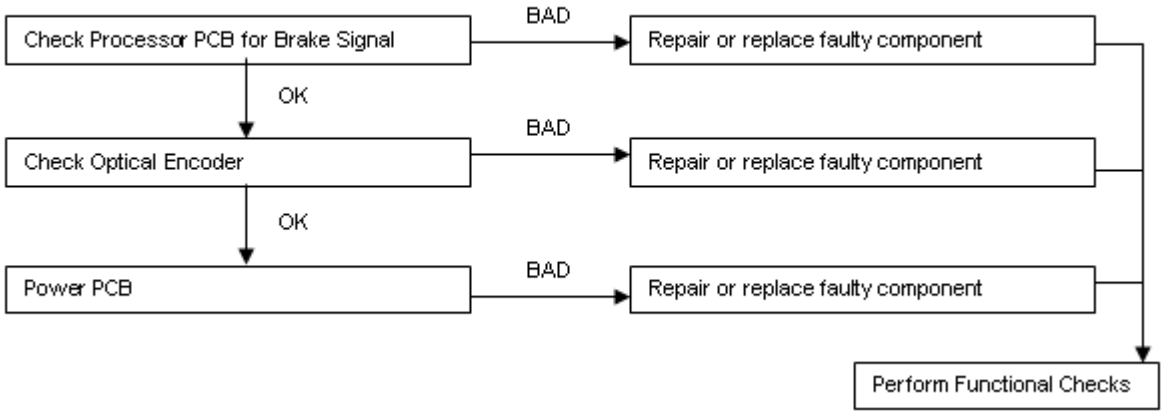
Refer to the "Power/Signal System Checks", "Wiring", & "Failure Mode" Table sections in this manual.



Important: Always read and follow the information box instructions.

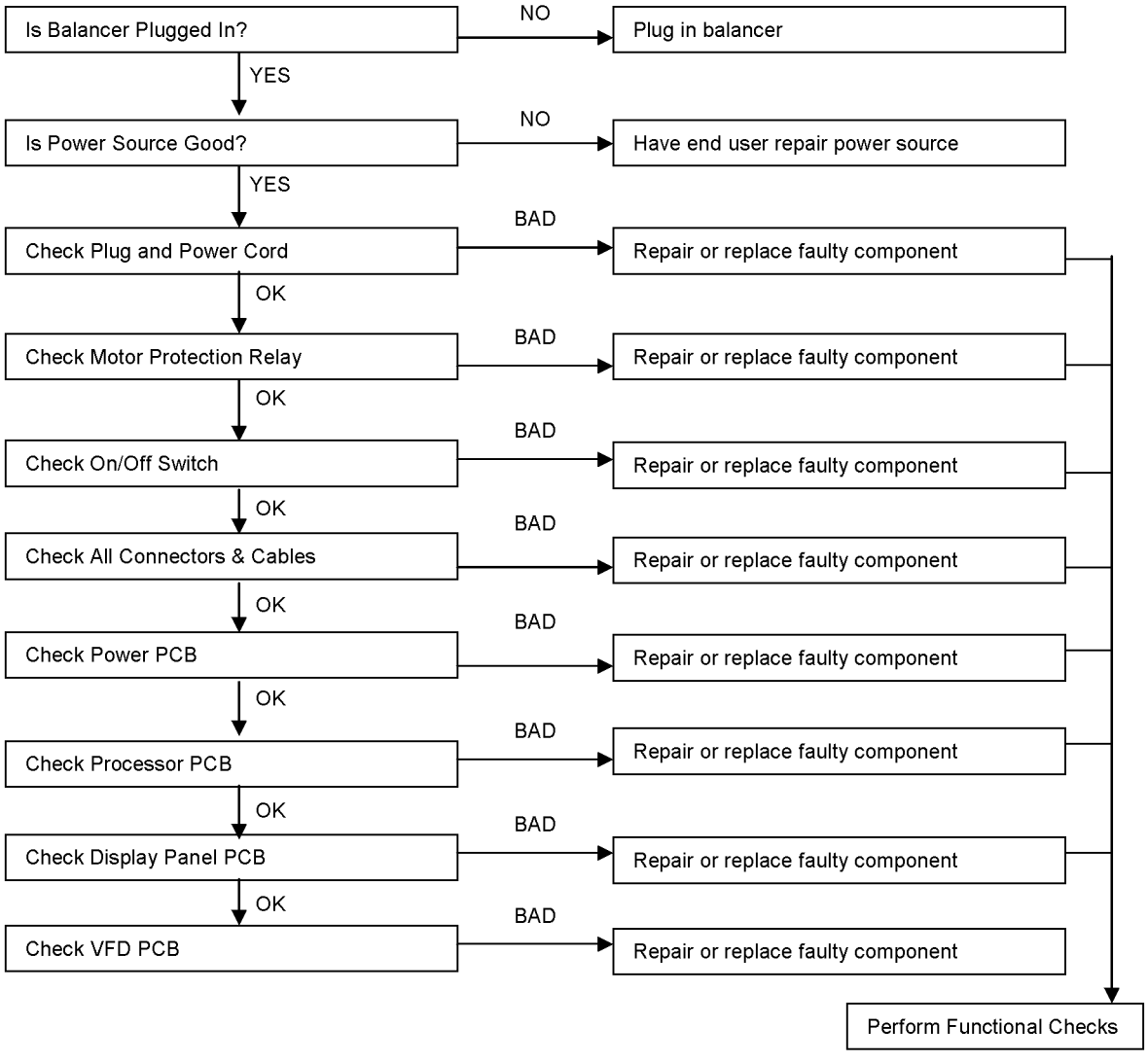
Balancer "Will Not Brake"

Refer to the "Power/Signal System Checks", "Wiring", & "Failure Mode" Table sections in this manual.

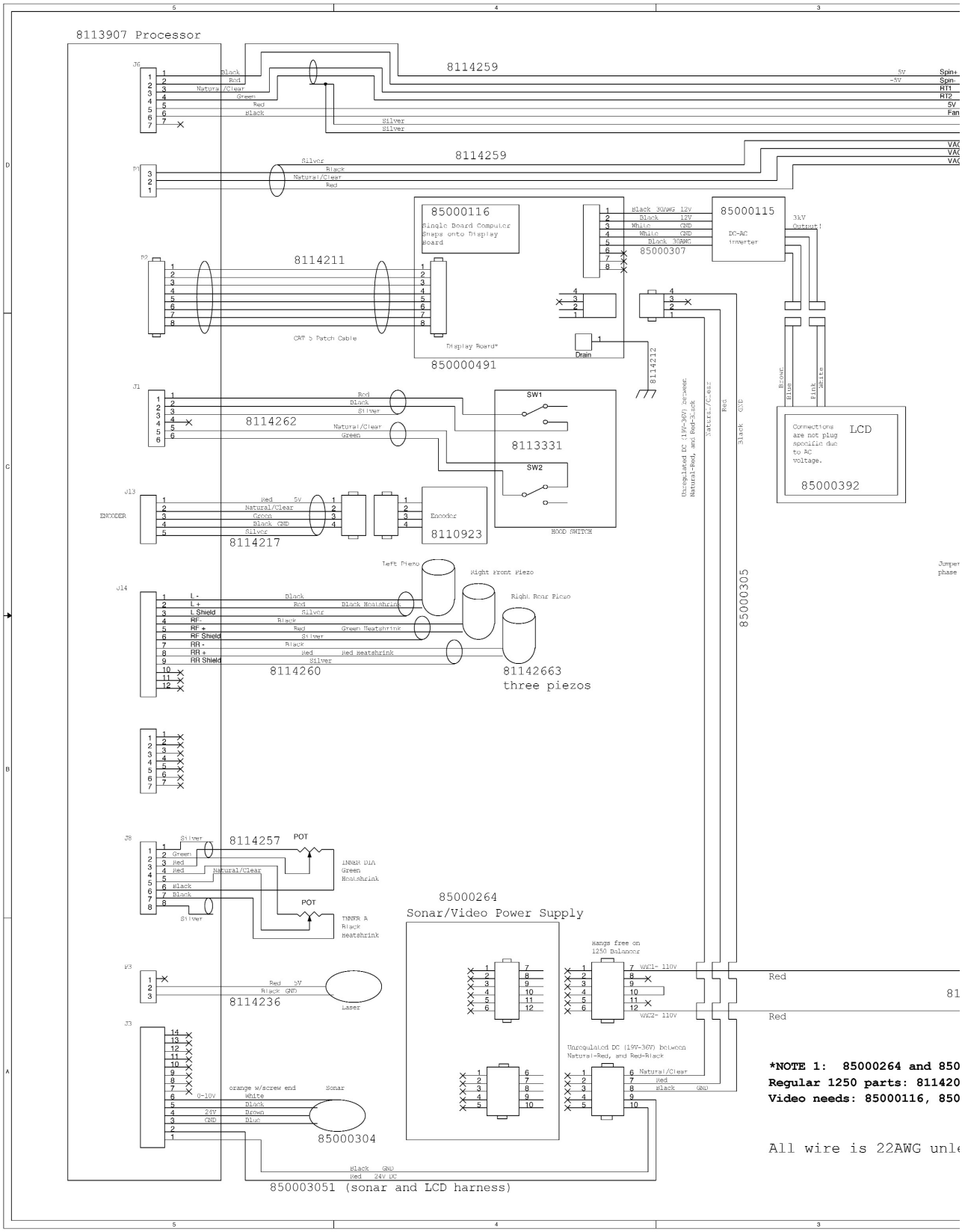


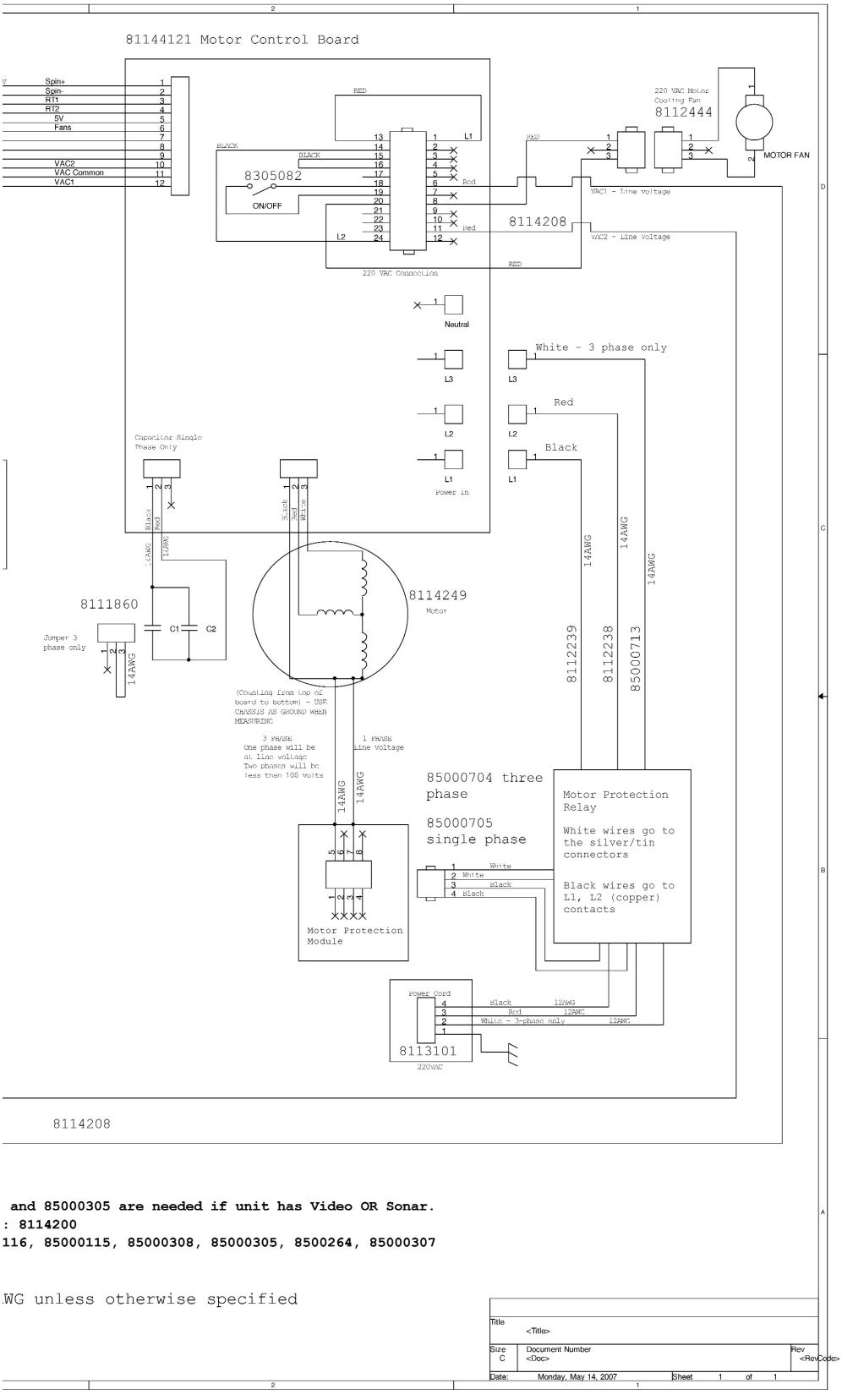
Balancer "Does Not Light Up"

Refer to the "Power/Signal System Checks", "Wiring", & "Failure Mode" Table sections in this manual.



Schematic Diagram — Power & Signal Flow



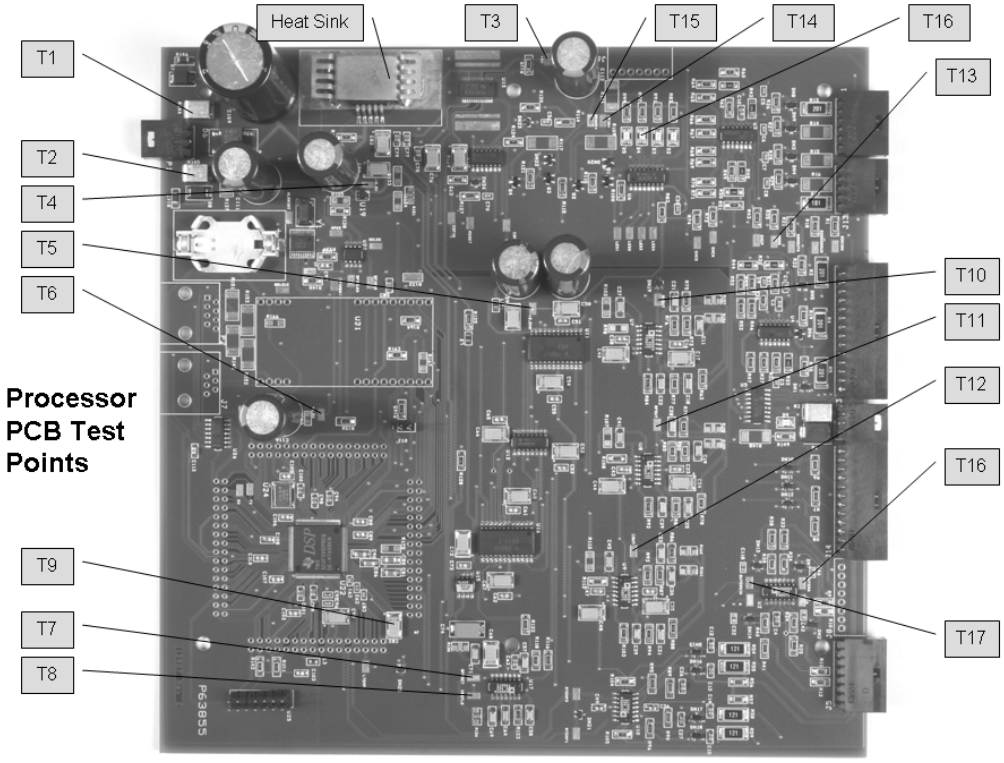


and 85000305 are needed if unit has Video OR Sonar.
: 8114200
116, 85000115, 85000308, 85000305, 8500264, 85000307

.WG unless otherwise specified

Title	<Title>	
Size C	Document Number <Doc>	Rev <RevCode>
Date: Monday, May 14, 2007	Sheet 1 of 1	

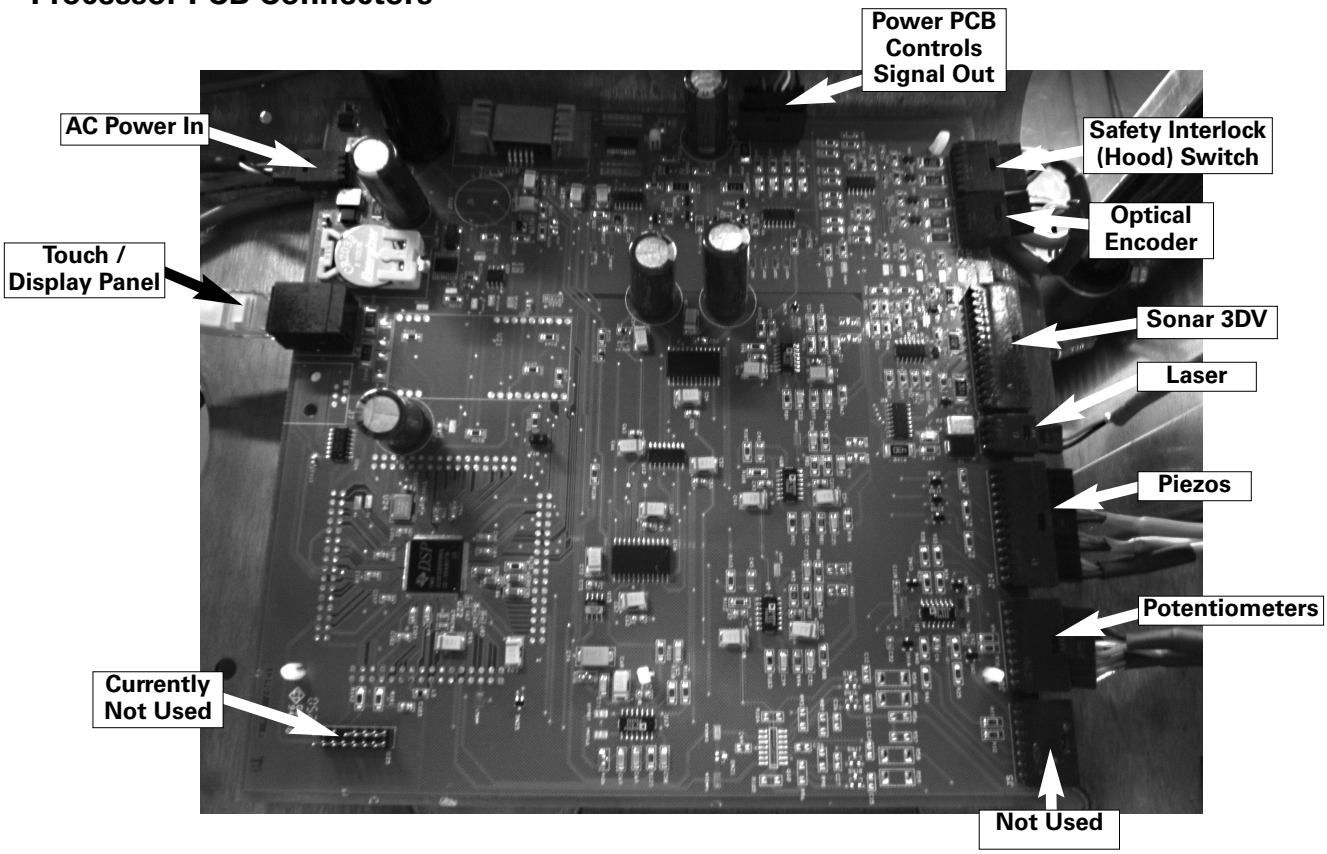
Processor PCB Test Points



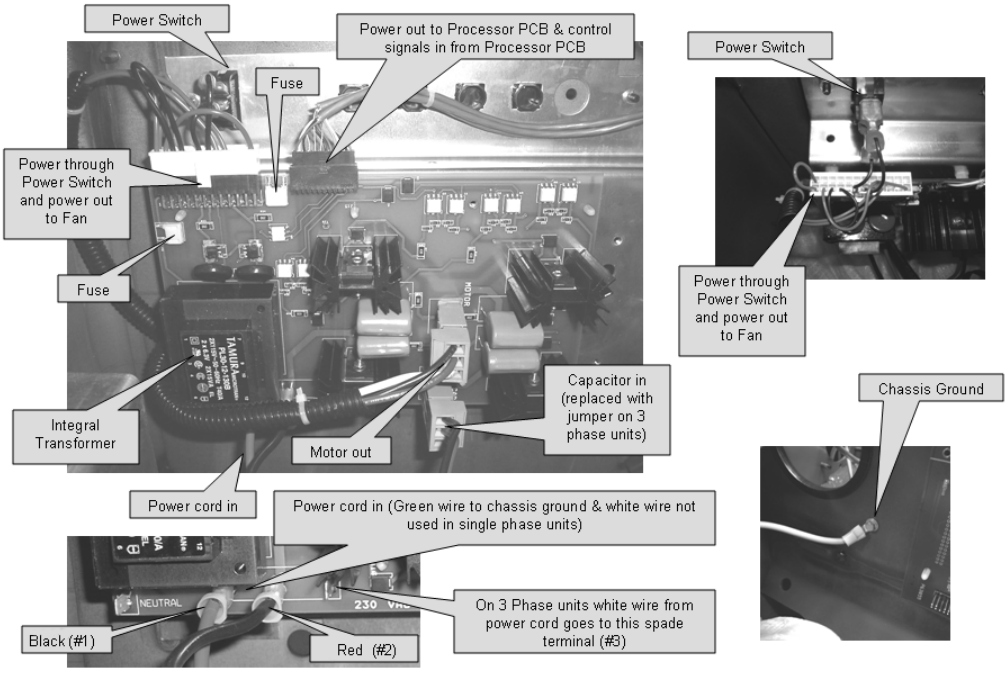
Note: Processor PCB revision H and backward will only drive 1250s. Revision I and forward will drive both 1250 and 1250 3DV.

1250 Processor PCB Test Points Key					
CAUTION: Failure to wear a grounded static wrist band when probing test points on the Processor PCB may result in permanent damage to the board.					
Test Point	Test Point Label on Processor PCB	V/O Meter Red Lead Location	V/O Meter Black Lead Location	Test Point Voltage	Test Description
T1/T2	R144/R145	T1	T2	13.0 VAC	Power supply from power PCB - if no voltage present, check power PCB & cable
T3	+5V	T3	Heat Sink	5.0 VDC	Processor PCB voltages - if no voltage present, check power PCB
T4	-3.3V	T4	Heat Sink	-3.3 VDC	Processor PCB voltages - if no voltage present, check power PCB
T5	+3.3V	T5	Heat Sink	+3.3 VDC	Processor PCB voltages - if no voltage present, check power PCB
T6	+1.8V	T6	Heat Sink	+1.8 VDC	Processor PCB voltages - if no voltage present, check power PCB
T7	VREFHI	T7	T9	+1.5 VDC	Reference voltage for analog to digital converter. Must use T9 as ground
T8	VREFLO	T8	T9	+0.0487 vdc	Reference voltage for analog to digital converter. Must use T9 as ground
T9	C82	n/a	n/a		Ground for T7 & T8
T10	RROUT	T10	Heat Sink	+1.5 VDC	Right Rear Piezo when shaft is NOT spinning
T11	RFOUT	T11	Heat Sink	+1.5 VDC	Right Front Piezo when shaft is NOT spinning
T12	LOUT	T12	Heat Sink	+1.5 VDC	Left Piezo when shaft is NOT spinning
T13	HOOD	T13	Heat Sink	0.6 VDC Hood Up or 3.3 VDC Hood Down	Check on function and proper wiring of Safety Guard Interlock Switches
T14/T15	SPIN+ / BRAKE+	SPIN+	BRAKE+	4.0 VDC to 5.0 VDC	Test for start and stop signal from processor - Positive voltage when spinning and negative voltage when braking
T16	D4	None	None	None	Optical Encoder working - Red LED should be blinking when balancer shaft is turning slowly or appear steady when shaft is rotating fast.
T17	OUTERA	T17	Heat Sink	variable VDC	Should be same VDC reading shown in Left Plane weight display when in arm calibration mode (check to verify Processor PCB)
T18	OUTERDIA	T18	Heat Sink	variable VDC	Should be same VDC reading shown in Right Plane weight display when in arm calibration mode (check to verify Processor PCB)

Processor PCB Connectors



Power PCB Test Points & Connectors

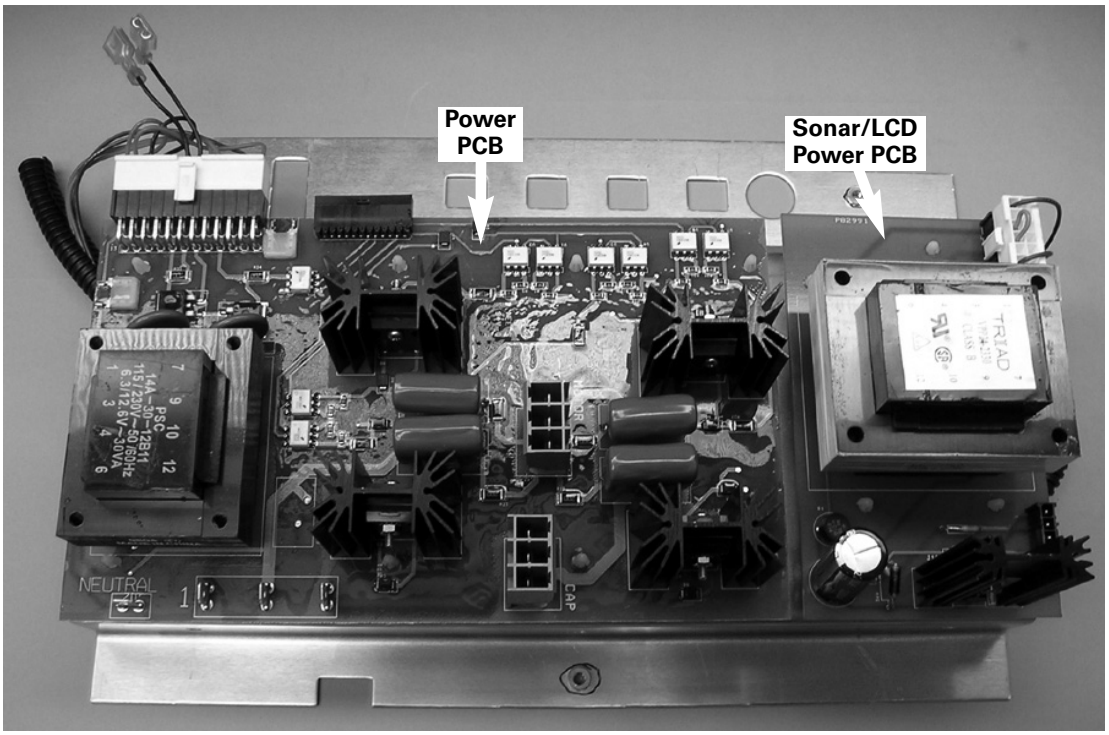

Power Switch
Power out to Processor PCB & control signals in from Processor PCB
Fuse
Power through Power Switch and power out to Fan
Fuse
Integral Transformer
Motor out
Capacitor in (replaced with jumper on 3 phase units)
Power cord in
Power cord in (Green wire to chassis ground & white wire not used in single phase units)
On 3 Phase units white wire from power cord goes to this spade terminal (#3)
Black (#1)
Red (#2)
Power Switch
Power through Power Switch and power out to Fan
Chassis Ground

Power PCB Test Points & Connectors (220V)

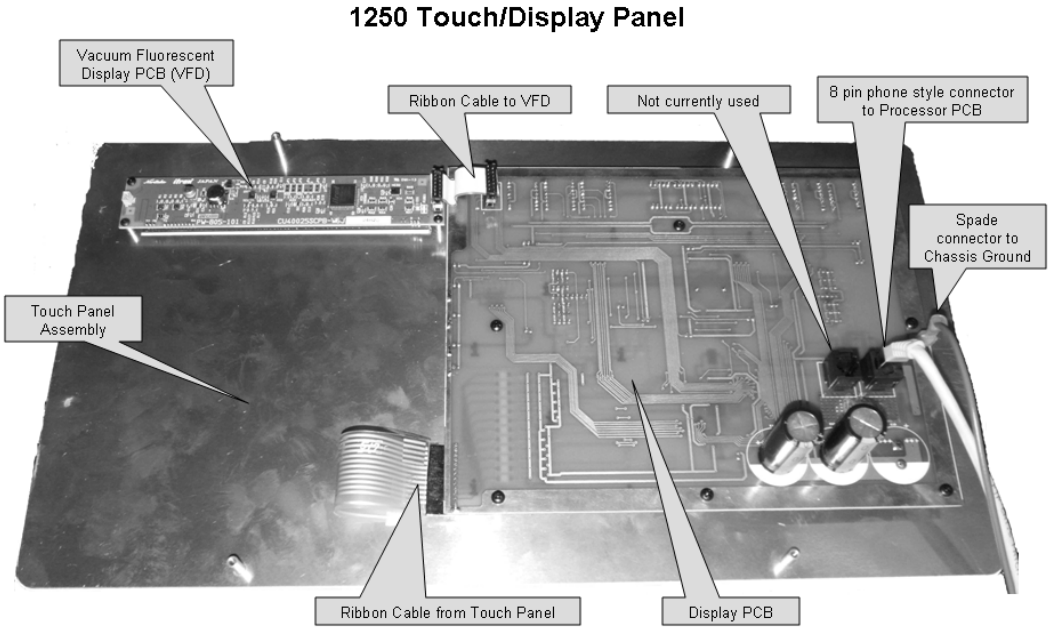
Important: Always read and follow the information box instructions.

1250 Power PCB Test Points & Connectors				
Item	**V/O Meter Red Probe Location**	**V/O Meter Black Probe Location**	**Voltage**	**Test Description**
Power Switch	Each black wire terminal	Chassis Ground	120 VAC	Check for power through Power PCB
Power Switch	Switch terminal with wires off	Other switch terminal with wires off	Continuity with switch in on position & no continuity with switch in off position	Check for good switch
Fuses	Each fuse terminal	Chassis Ground	120 VAC	Check for power through Power PCB
Fuses	Fuse terminal **(with balancer unplugged)**	Other Fuse terminal **(with balancer unplugged)**	Continuity	Check for good fuse
Power Cord Black	Power Cord Black	Chassis Ground	120 VAC	Check for power through cord
Power Cord Red	Power Cord Red	Chassis Ground	120 VAC	Check for power through cord
Power Cord White **(3 phase only)**	Power Cord White	Chassis Ground	120 VAC	Check for power through cord
Jumper **(3 phase only)**	Each wire	Chasis Ground	120 VAC	Check for power through jumper
Motor Out connector	Each wire terminal	Chassis Ground	120 VAC	Check for power through pover PCB
Capacitor connector	Each wire terminal	Chassis Ground	120 VAC	Check for power through pover PCB
Each Red wire in power out to power switch and to fan connector	Each Red wire terminal	Chassis Ground	120 VAC	Check for power through pover PCB
Black jumper wire in power out to power switch and to fan connector	Each Black wire terminal	Chassis Ground	60 VAC	Check for power through pover PCB

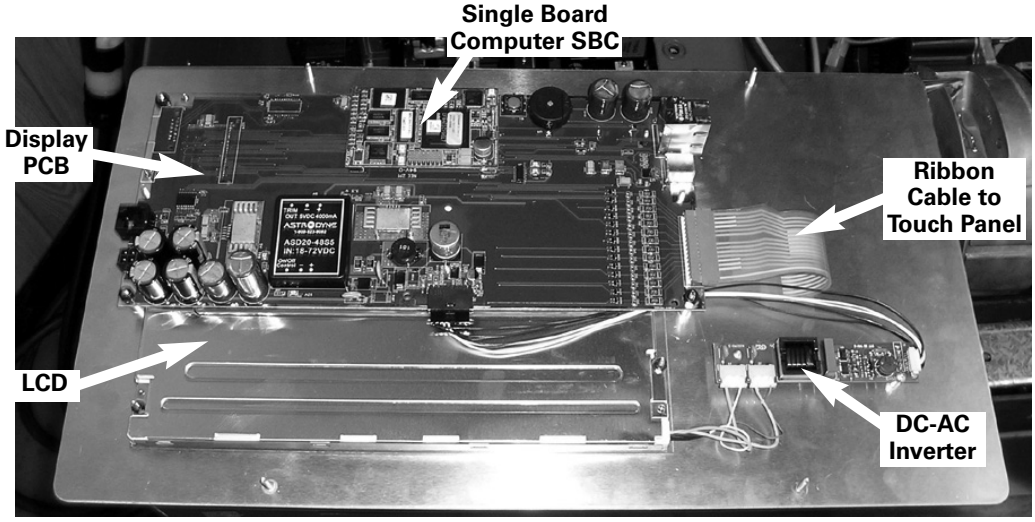
Power Panel



1250 Touch/Display Panel

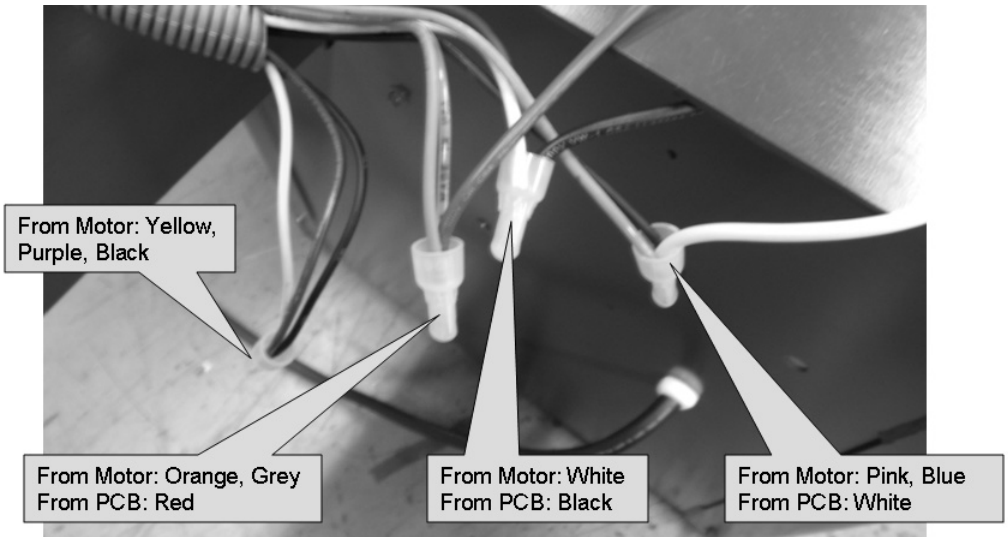

1250 Touch/Display Panel
Vacuum Fluorescent Display PCB (VFD)
Ribbon Cable to VFD
Not currently used
8 pin phone style connector to Processor PCB
Spade connector to Chassis Ground
Touch Panel Assembly
Ribbon Cable from Touch Panel
Display PCB

1250 3DV Touch/Display Panel



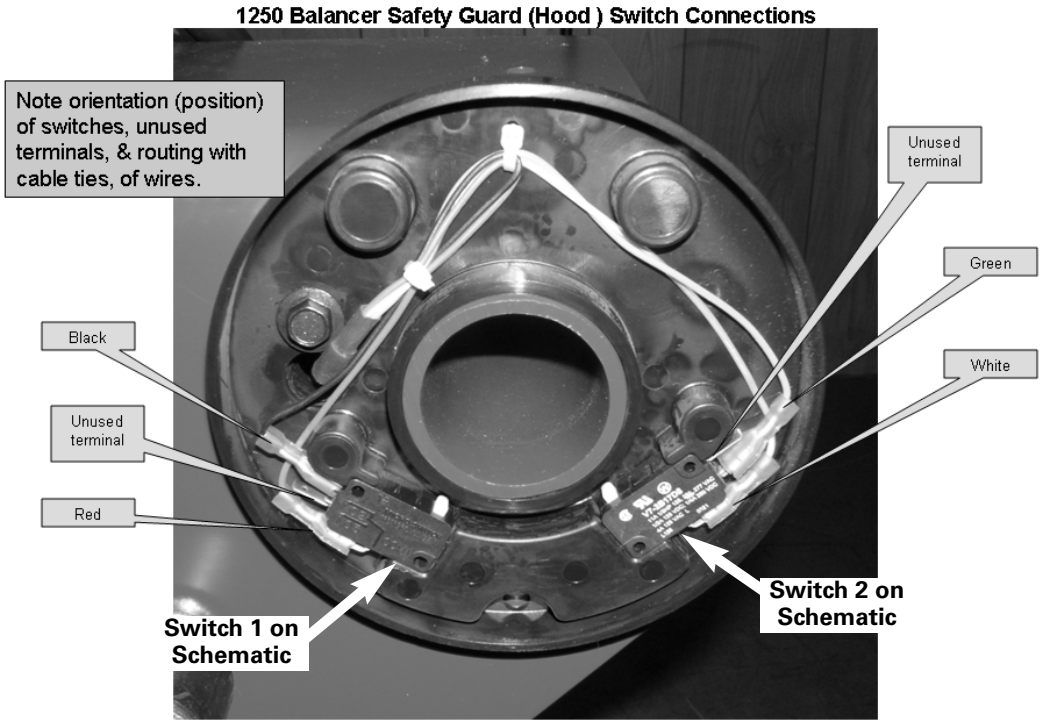
Power PCB to Motor Connections

1250 220V 1P Power PCB to Motor Connections

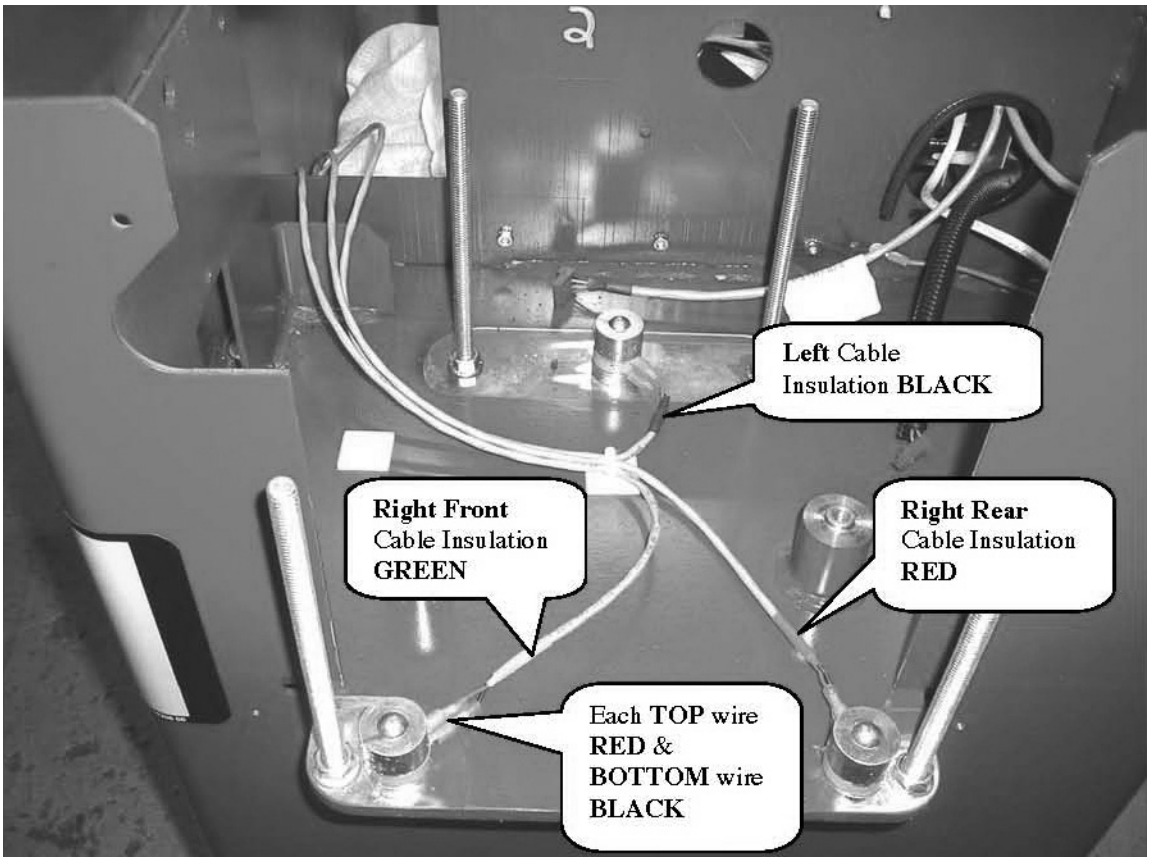


Important: Always read and follow the information box instructions.

Safety Guard (Hood) Switch Connections



Piezo Wire Heat Shrink Color Codes


Left Cable Insulation BLACK
Right Front Cable Insulation GREEN
Right Rear Cable Insulation RED
Each TOP wire RED & BOTTOM wire BLACK

Calibration

Machine Calibration

4-ounce (100 gram) - Calibrate the machine only after verifying that the machine is out of calibration as shown by functional checks. Of course if you adjust or replace parts like piezos or potentiometers, calibration is also necessary.

1. Mount a 14, 15, or 16-inch steel tire/wheel assembly on the balancer. A balanced tire/wheel is required.

Note: Position wheel so that no weights on either flange are at the top-dead-center location. Turn the machine OFF then ON.

2. Enter DIMS (A, W, and D wheel dimensions).

3. Press and hold the SHIFT key and press 1 to select the CAL MACHINE mode.

4. Lower the hood and press START.

5. After spin, raise the hood. Rotate wheel until the right plane center bar blinks; attach test weight to the outside flange at top-dead-center: 4-ounce (100 grams)

Figure 19 - Test Weight On Outside Flange At Top-Dead-Center

6. Lower the hood and press START.

Important: It is critical that the inner weight be placed accurately to achieve proper calibration. If the test weight is not moved from the outside flange directly across to the inside flange an inner weight placement error will occur. To correct, follow the information box instructions.

7. After spin, raise hood. Rotate wheel until left plane center bar blinks; move and attach test weight to inside flange at top-dead-center: 4-ounce (100 grams)

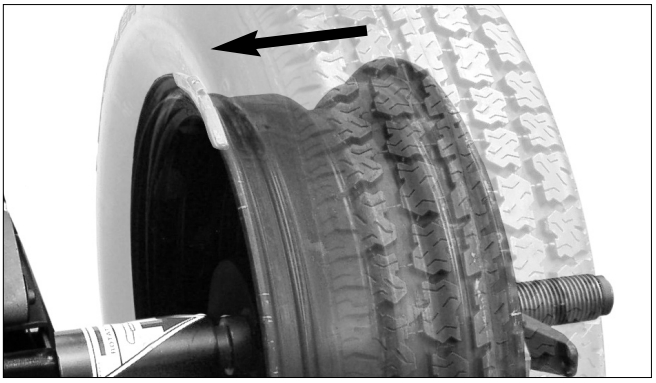


Figure 20 - Test Weight Moved (Directly Across) To Inside Flange

8. Lower the hood and press START.

9. Calibration complete. Press NEXT.

Sonar (3DV) Calibration

Each time a 4 ounce (100 gram) calibration is performed, the width sonar is automatically calibrated.

If a width sonar calibration is required, as in after replacing a sonar unit, simply perform a 4 ounce (or 100 gram) calibration.

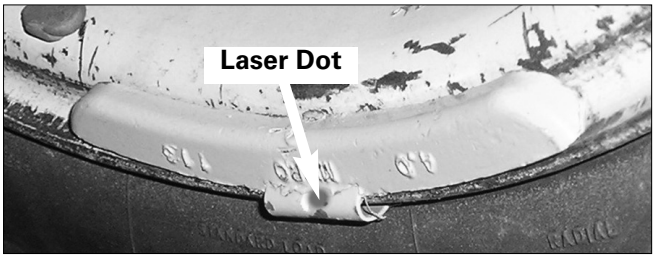
Laser (Dot) Calibration

This calibration only needs to be performed if the motor, laser housing, or processor PCB is replaced.

Follow the steps for a normal 4 ounce calibration EXCEPT enter "Shift 2" (laser) then the "96" service access code.

One additional step is added to the 4 ounce calibration procedure.

The laser dot will automatically turn on.



Position the dot on the inner rim flange.

With the 4 ounce weight on the inside flange, rotate the wheel until the dot is at the center of the weight and then press the "Next" key.

A & D Arm

You must always perform the 4-ounce calibration just prior to doing the A & D arm calibration.

In fact, the balancer will not permit you to do otherwise. This is because when you do the 4-ounce calibration, the balancer actually calculates the "A" dimension and the "W" dimension. If fact, the "A" and/or "W" dimension displayed may change during calibration. The Arm calibration gives the balancer a reference point to the edge of the faceplate and home position. When you enter the "A" dimension from the arm rod, it calculates the difference from the 4-ounce calibration "A" and uses that as a factor for manual "A" entry. Arm calibration also gives the "D" dimension a reference point from home position.

Perform the 4-ounce calibration:

Note: A & D Arm calibration is NOT available to end users and must be accessed with an extended Command Code only published in the service manual.

1. Depress and hold the "Shift" key and depress the number 3 key "Cal Arm". "CdE" will appear in the LEFT PLANE weight display.

2. Enter Code "96" (A brief version of the following calibration steps will now appear in the "Information Box")

3. Bring the edge of the tip of the arm precisely to the outer edge of the faceplate and hold it there while you depress the "Next" key. (It may be necessary to loosen the calibration wheel temporarily to do this depending on the wheel size and configuration.)

4. With the arm still at the edge of the face plate enter the "A" (offset) dimension shown on the arm rod. Depress the "Next" key.

5. Move the arm to its home position and depress the "Next" key.

6. Move the arm to the Clip-1 position on the rim flange and hold it there while you manually enter the D dimension. Depress the "Next" key.

7. While still holding the arm at the Clip-1 position on the wheel, depress the "A" key and enter the dimension on the arm rod. Depress the "Next" key.

8. Return the arm to the home position and calibration is complete.

Note: If you did not complete the A&D arm calibration successfully, you can bypass the 4-ounce calibration with code "Shift 0, 19" to try again without having to repeat the 4-ounce calibration.

Adjustments

Laser

CAUTION

Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Focus

1. Mount a 16 inch wheel on the balancer.

2. Depress and hold the "Shift" key while depressing the number 2 "Cal Laser" key to turn on the laser with a steady beam.

3. Rotate the knurled knob on top of the laser assembly to move the beam to the position where a right plane Tape-A-Weight would go on the inside of the wheel.

4. Use a medium wide flat blade screw driver to slightly turn the set screw where the laser projects from. This will cause the dot on the wheel to get larger or smaller. Adjust until the dot is about 1/8 inch to 3/16 inch in maximum diameter. (Note: with the wheel on, unless you have a "stubby" screw driver, it may be necessary to turn the knurled knob on top of the laser to bring the adjustment screw to an accessible position. Then return the beam to the desired position in the wheel to check the result.)

5. Depress and hold the "Shift" key and depress the number 2 key, "Cal Laser", 2 times to take the balancer out of the "Cal Laser" mode.

Rotational Force

If the laser is difficult to turn using the knurled knob or if it is too loose and will not hold position:

• Use a 3/16-inch Allen wrench to loosen or tighten the set screw on the bottom of the laser bracket until the cylindrical laser housing assembly rotates but with sufficient drag to hold position. (Loctite 242 is applied to the threads of this set screw during assembly to prevent it from backing out as the laser is rotated.)

Line Laser

Loosen or tighten the Allen head screw and spring that fasten the housing to the arm until the housing will pivot with some resistance.

Display Pod (Touch Panel/Display)

Touch Panel/ Display (Vertical Plane)

• Pivot the pod to the desired angle by pushing on the top and pulling on the bottom or visa versa.

• If the pod resists movement, slightly loosen the two 3 wing knobs on the back of the display pod and try again. (Note that if the knobs are tightened to the correct tension, it will not be necessary to loosen them and retighten them to move and maintain the desired position.)

VFD or LCD (3DV) Brightness

There are various brightness levels that the VFD or LCD backlight can be set at. Use and repeat Command Code "Shift 0, 61" to scroll through the choices. The balancer will automatically save and then power up at the level it is set at when it is shut off.

Pod Support Tube

• Pivot the pod tube to bring the Touch Panel/Display to the desired position by pushing or pulling on the left edge of the display panel while gripping the support tube with your other hand.

• If the pod resists movement, use a 1/2-inch wrench/socket to slightly loosen the four Nyloc u-bolt nuts that retain the support tube to the chassis support bracket and try again. (Note that if the nuts are tightened to the correct tension, it will not be necessary to loosen them and retighten them to move and maintain the desired position.)

Piezos

The preload on the piezos is adjusted by tightening or loosening the Nyloc nuts that retain the piezo springs. The desired setting for each spring height is 2 inches, plus or minus 1/16th inch, from the bottom spring seat to the top of the piezo spring retainer.

1. Unplug the balancer.

2. Remove the Weight Tray and Shield. (See appropriate "Replacement Procedures" section in this manual.)

3. Remove the motor cover and gasket enough to access the right side piezo spring assemblies.

4. Measure each spring height and use a 9/16th-inch wrench/socket to tighten or loosen the Nyloc retaining nut to achieve the above dimensional requirement.

5. Assemble the balancer.

6. Perform the 4-ounce calibration procedure for weight amount and location.

Potentiometers

The potentiometers are adjusted to have the correct base value when the arm is in the home position. This will prevent them from over rotating (crossing their zero point) during normal usage of the arm. Each potentiometer should display a value from 0.40 through 0.70 in its weight display when the arm is in the home position.

1. Remove the Weight Tray and Shield. (See appropriate "Replacement Procedures" section in this manual.)

2. Depress "Shift 0" then enter code "19" to bypass 4-ounce calibration and access the A & D arm calibration.

3. Depress and hold the "Shift" key while you depress the number "3" key (Cal Arm).

4. Depress "96"

5. Do not perform the calibration.

6. The LEFT PLANE Weight display now shows voltages for the "A" (offset) potentiometer and the RIGHT PLANE Weight display shows voltages for the "D" (diameter) potentiometer.

"D" Dimension Potentiometer

1. Use a 3 mm Allen wrench to slightly loosen the set screw that secures the potentiometer shaft in the rod.

2. With the arm in home position, pull the potentiometer shaft out of the rod just enough to grip it with needle nose pliers.

3. Carefully rotate the shaft to achieve the desired reading in the right plane weight display (0.40 through 0.70).

4. Carefully slide the shaft back into the rod.

5. Check to make sure the reading did not change and tighten the set screw to secure the shift in the rod.

6. Rotate the arm, simulating a rim measurement, to make sure the reading changes and then returns to your same setting in the home position.

7. Reassemble the balancer in reverse order.

"A" Dimension Potentiometer

1. Use a 2 mm Allen wrench to slightly loosen the set screw that secures the pulley to the potentiometer shaft.

2. With the arm in home position, use a small flat blade screw driver to carefully rotate the potentiometer shaft to achieve the desired reading in the left plane weight display (0.40 through 0.70).

3. While holding the position of the shaft with the screw driver, tighten the set screw that secures the pulley to the shaft.

4. Pull out the arm, simulating a rim measurement, to make sure the reading changes and then returns to your same setting in the home position.

5. Reassemble the balancer in reverse order.

Replacement Procedures

Do not disassemble, adjust or replace any part before performing the appropriate "Functional Checks" and "Power/Signal System Checks" described in this manual. These procedures, used in conjunction with the material found in the "Reference" section of this manual, will isolate the necessary adjustment or replacement. Perform checks exactly as specified. Refer to the "Parts Identification" manual (Parts List) for this unit for parts identification and assembly structure. Some standard commercial fittings and fasteners are used in this unit and can be obtained locally if necessary.

Power System

Plug

1. Unplug the balancer from the power source.

2. Loosen or remove the fasteners that join the 2 parts of the plug.

3. Note which wires are used and their locations.

4. Remove the wires from their terminals.

5. Remove the power cord from the plug.

6. Insert the power cord into the new plug part.

7. Connect the wires to their terminals.

8. Join the 2 plug parts and tighten the fasteners.

9. Plug in the balancer and functional test.

Power Cord

1. Unplug the balancer from the power source.

2. Loosen or remove the fasteners that join the 2 parts of the plug.

3. Note which wires are used and their locations.

4. Remove the wires from their terminals.

5. Remove the power cord from the plug.

6. Remove the Weight Tray and Shield. (See appropriate "Replacement Procedures" section in this manual.)

7. Disconnect the power cord wires from the Power PCB and the Chassis Ground. Refer to the appropriate "Wiring" section in this manual.)

8. Note the distance from the strain relief bushing to the chassis end of the old power cord.

9. Remove the strain relief bushing and then the old power cord from the back of the chassis.

10. Position the strain relief bushing on the new cord at the noted distance from the chassis end.

11. Install the cord and strain relief bushing into the chassis.

12. Connect the power cord wires to the Power PCB and the Chassis Ground

13. Insert the new power cord into the plug.

14. Connect the wires to their terminals.

15. Join the 2 plug parts and tighten the fasteners.

16. Install the Weight Tray and Shield.

17. Plug in balancer and perform a functional test.

Replace PCB/Contactor Assembly

1. Unplug the balancer from the power source.

2. Remove the weight tray and shield.

3. Note their locations and disconnect the wires from the relay's PCB/Contactor Assembly.

4. Remove fasteners that hold assembly to Capacitor Bracket.

5. Install the new assembly in reverse order.

6. Functional test the balancer.

7. If good, install the shield and weight tray.

On/Off Switch

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Disconnect the wiring to the on/off switch.

4. Squeeze retainers at the top and bottom of the switch and push it through the opening in the chassis.

5. Install the new on/off switch.

6. Connect the wires to the switch.

7. Plug in the balancer and test the switch for proper functions.

8. If good, unplug the balancer and install the Weight Tray and Shield.

Power PCB

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Remove all of the cable/wire connectors from the Power PCB.

4. Remove the Power PCB from its stand offs.

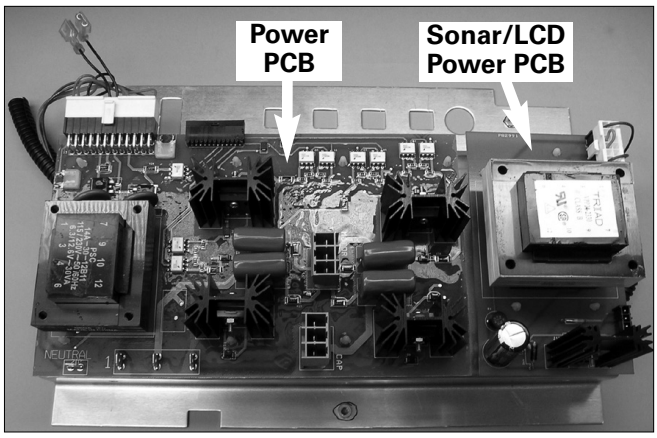
5. Install the new Power PCB on the stand offs.

6. Connect all of the cable/wire connectors to the new Power PCB. (Refer to the appropriate section of the "Wiring" section in this manual.)

7. Install the Weight Tray and Shield.

8. Plug in the balancer.

9. Perform the appropriate functional checks.



Sonar/LCD Power PCB (3DV)

1. Unplug the balancer from the power source.

2. Remove the weight tray. (See appropriate replacement procedure in this manual.)

3. Remove the heat shield. (See appropriate replacement procedure in this manual.)

4. Note locations and routing and disconnect the cables from the Sonar/LCD Power PCB.

5. Remove the Sonar/LCD Power PCB from its stand offs on the power panel.

6. Install in reverse order.

7. Perform a functional check.

Capacitors

Capacitor Assembly

1. Unplug the balancer.

2. Remove weight tray and weight tray shield.

3. Disconnect plug to capacitor assembly from Power PCB.

4. Remove four (4) 6 - 32 X 1/2 screws holding capacitor panel to chassis

5. Install new capacitor assembly.

6. Connect plug.

7. Install weight tray, weight tray shield and plug in balancer.

8. Perform "Preliminary Inspection" & "Functional Checks".

Capacitor

1. Unplug the balancer.

2. Remove weight tray and weight tray shield.

3. Disconnect plug to capacitor assembly.

4. Remove three (3) 6 -32 X 1/2 screws holding capacitor clamps to capacitor panel and remove capacitor clamps.

5. Remove capacitors. Note wire locations, disconnect wires from capacitors and transfer wires to new capacitors

Note: Only one capacitor should have a resistor connected across its terminals. If both new capacitors have resistors, cut one out.

6. Install capacitors.

7. Connect plug.

8. Install weight tray, weight tray shield and plug in balancer.

9. Perform "Preliminary Inspection" & "Functional Checks".

Input System

A & D Arm Assembly

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

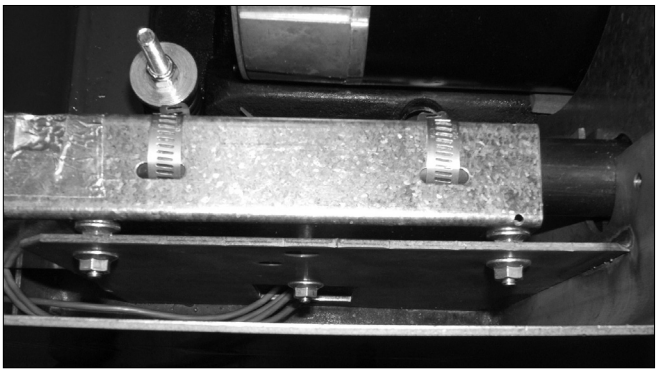
Note: The routing and the tie down points and disconnect the potentiometer cable from the Processor PCB. (Refer to the appropriate illustration in the "Wiring" section of this manual.)

4. Remove the A & D arm from the A & D rod.

5. Remove the motor cover fasteners and pull the motor cover, gasket, and shield away from the side of the balancer. (This will allow space to remove the A & D Arm assembly later.)

6. Use a 7/16 inch wrench to remove the 3 nuts that fasten the assembly to its chassis member.

7. To remove the assembly, hold the motor cover and shield out of the way as you lift upward and pull rearward on the assembly to slide the A & D tube out of the chassis cutout.



8. Install in reverse order.

9. Plug in the balancer.

10. Perform required "Functional Checks".

Potentiometers

Note: Potentiometers are replaced in sets with cable on the 1250.

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

Note: The routing and the tie down points and disconnect the potentiometer cable from the Processor PCB. (Refer to the appropriate illustration in the "Wiring" section of this manual.)

3. Remove the spring from the edge of the A & D arm housing to release the tension on the string

4. Use a 2mm Allen wrench to loosen the set screw in the A pulley and remove the pulley from the potentiometer shaft.

5. Remove the A potentiometer retaining nut and washer.

6. Remove the A potentiometer bracket from the housing.

7. Remove the A potentiometer from its bracket.

8. Remove the 3 mm cap screw and washer that retains the string bracket on the back end of the A & D rod. (It may be necessary to remove the arm to allow the rod further back for access.)

9. Use a 3mm Allen wrench to loosen the set screw that retains the D potentiometer shaft in the end of the A & D rod and remove the potentiometer and A & D pendulum assembly.

10. Remove the nut and washer from the D potentiometer.

11. Remove the cable ties and then remove the pendulum.

12. Install in reverse order.

Important: During installation, pay close attention to the routing of the cables and their tie down points as well as the string routing and seating on the A pulley. Be sure the slot on the bottom of the A & D pendulum engages the bottom lip of the housing.

13. Plug in the balancer and perform an A & D potentiometer adjustment procedure. (Refer to the "Adjustments" section of this manual.)

14. Unplug the balancer.

15. Install the Processor PCB cover and the weight tray and shield.

16. Plug in the balancer.

17. Perform "Functional Checks".

18. Perform an A & D arm calibration. (Refer to the Calibration section of this manual.)

Rod, Tube, & Bushings

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Disconnect the return spring from the front edge of the housing.

4. Remove the arm.

5. Remove the string bracket from the back end of the rod. (Refer to the potentiometer replacement section above.)

6. Remove the D potentiometer from the rod. (Refer to the potentiometer replacement section above.)

7. Slide the rod out of the front of the tube.

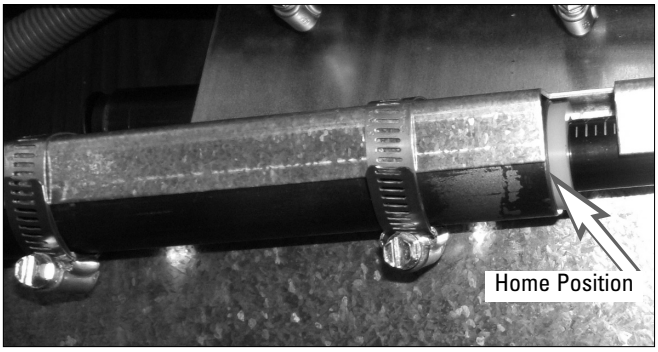
8. Remove the bushings. (Bushings may be more easily removed after removing the tube.)

9. Remove the 2 hose clamps that secure the tube to the housing.

10. Remove the tube by pulling it out of the chassis cutout and lifting it out of the balancer..

11. Install in reverse order.

Important: During installation, be sure the string is fully seated and correctly routed on the A pulley and the slot on the bottom of the A & D pendulum is properly engaged on the lip of the housing. Before tightening the hose camps to secure the tube, be sure that the back edge of the tube is lined up with the front edge of the positioning cutout in the housing as shown in the illustration.



This defines the "A" home position of the arm.

12. Plug in the balancer and perform an A & D potentiometer adjustment procedure. (Refer to the "Adjustments" section of this manual.)

13. Unplug the balancer.

14. Install the Processor PCB cover and the weight tray and shield.

15. Plug in the balancer.

16. Perform "Functional Checks".

17. Perform an A & D arm calibration. (Refer to the Calibration section of this manual.)

Optical Encoder & Rotary Shutter

Optical Encoder

1. Unplug the balancer.

2. Remove weight tray and weight tray shield.

3. Remove rear end bell cover from motor.

4. Remove rotary shutter.

5. Disconnect optical encoder plug.

6. Slide optical encoder from aluminum rear end bell casting.

7. Install new optical encoder.

8. Install rotary shutter.

9. Install rear end bell.

10. Connect optical encoder plug.

11. Install weight tray and weight tray shield.

12. Plug in balancer.

13. Perform Functional Checks.

Rotary Shutter

1. Unplug the balancer.

2. Remove weight tray and weight tray shield.

3. Remove rear end bell cover from motor.

4. Remove 3/8 x 3/8 shoulder bolt and rotary shutter.

5. Install the new rotary shutter.

6. Put Loctite 242 or equivalent on the 3/8 shoulder bolt threads, install and tighten.

7. Install rear end bell cover.

8. Install weight tray and weight tray shield.

9. Plug in balancer.

10. Perform Functional Checks.

Piezos

1. Unplug the balancer.

2. Remove A & D Arm from rod.

3. Remove weight tray, weight tray shield, motor cover, motor cover gasket, and motor cover shield.

4. Remove the laser assembly by removing the two ° inch Allen screws that retain the laser bracket to the front of the motor.

5. Remove the four (4) 3/8 - 16 Nyloc spring retaining nuts, spring retainers and piezo springs.

6. Remove two (2) 5/16 - 18 X1 washer head screws.

7. Disconnect fan motor and optical encoder plugs.

8. Disconnect the motor wires from the power board PCB motor plug wires. (See illustration in the "Wiring" section of this manual.

9. Lift out the motor assembly.

10. After noting the wire colors, disconnect the wires to the piezos.

11. Remove the piezo assemblies from the chassis.

Note: The piezo assemblies used in the models 950 and 1050 balancers are different from other Coats balancers in that they are held in position by studs in the bottom of the piezo carriers that fit into holes in the chassis. New piezos have the ball molded into the top casting.

12. Use emery cloth to clean the mounting surfaces of the piezo assemblies and chassis, install new piezo assemblies and connect wires.

13. Install the motor assembly

14. Install two (2) 5/16 - 18 X1 washer head screws.

15. Install piezo springs, spring retainers and Nyloc nuts.

16. Tighten the Nyloc nuts until the distance from the top of the motor cradle to the top of the retainer is two (2) inches.

17. Install the laser assembly

18. Install the motor wires to the wires coming from the motor connector on the Power PCB. (See illustration in "Wiring" section of this manual.)

19. Connect fan motor and optical encoder plugs.

20. Install motor cover shield, motor cover gasket, motor cover, weight tray shield, weight tray, and A & D arm.

21. Plug balancer in.

22. Perform Functional Checks & 4-oz calibration.

Sonar (3DV)

Sonar

1. Unplug the balancer from the power source.

2. Disconnect the sonar cable from the bottom of the sonar unit 3.

3. Remove the large top nut that holds the sonar unit in its bracket.

4. Slide the sonar unit from the bracket.

5. Remove the top nut from the new unit.

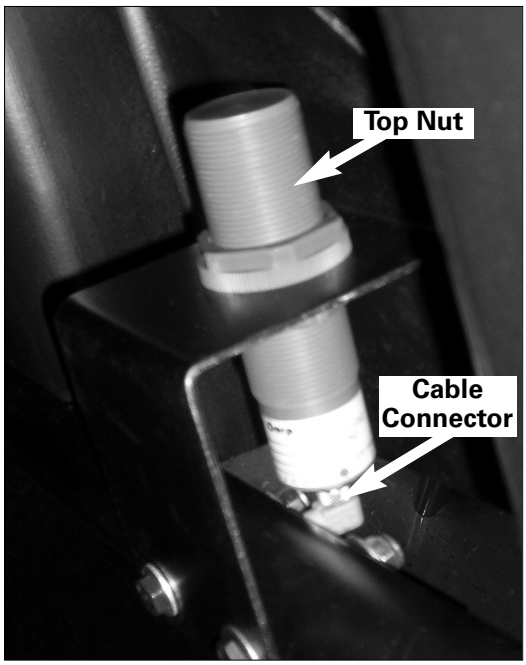
6. Position the bottom nut on the new unit at the same height as the bottom nut on the old unit.

7. Connect the cable.

8. Slide the new unit into the bracket.

9. Check to be sure the sonar cable is still in line with the hole in the hood bar.

10. Tighten the top nut on the sonar unit.



11. Plug in the balancer.

12. Perform a 4-ounce calibration to calibrate the sonar.

13. Perform a functional check.

Sonar Cable

Note: The sonar cable is part of an assembly that includes three cables. Replacement of any of the cables requires replacement of the entire cable assembly.

1. Unplug the balancer from the power source.

2. Disconnect the sonar cable from the bottom of the sonar unit.

3. Pull the sonar cable out of the hood bar.

4. Remove the balancer's weight tray and heat shield.

5. Note the routing and pull the sonar cable into the balancer.

6. Disconnect the sonar cable from the Processor PCB.

7. Disconnect the associated cable from the Sonar/Display Power PCB.

8. Remove the touch panel assembly.

9. Disconnect the associated cable from the display.

10. Note the routing and pull the cable into the balancer.

11. Assemble in reverse order.

12. Perform a functional check.

Sonar Bracket

1. Unplug the balancer from the power source.

2. Remove the sonar. (See appropriate replacement procedure in this manual.)

3. Remove the two bolts that fasten the sonar bracket to the hood bar.

4. Assemble in reverse order.

5. Plug in the balancer.

6. Perform a 4 ounce calibration to calibrate the sonar.

7. Perform a functional check.

Safety Guard (Hood) Switch

1. Unplug the balancer from the power source.

2. **If replacing the cable**, remove the Weight Tray and Shield and the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

3. Remove the safety guard (hood) assembly. (See the appropriate section of the "Replacement Procedures" in this manual.)

4. Pull off the switch cam cover.

5. Note the orientation (position) of the switches, wire terminal connections, cable routing and tie downs. (See appropriate section of "Wiring" in this manual.

6. Use a small flat blade screw driver to carefully pry out the switches.

7. Remove the wires from the switches.

8. Remove the wire tie downs and pull off the hood switch housing.

Note: The cable must be removed and installed through the chassis support bracket and the back of the hood switch housing because the connector to the Processor PCB is too large to fit through these holes.

9. If replacing the cable, pull it into the chassis and disconnect it from the Processor PCB.

10. After re-assembly, plug in the balancer.

11. Perform the appropriate functional checks.

Touch Panel

1. Unplug the balancer from the power source.

2. Use a #1 Phillips screw driver to remove the four screws and spacer bushings (if so equipped), on the back of the pod that retain the Touch Panel.

3. From the front of the pod, carefully pull out the Touch/Display Panel assembly.

4. Disconnect the 8 pin phone style connector cable on the back of the Display PCB. (See illustration in the "Reference Materials" section of this manual.)

5. Disconnect the green ground wire from its spade terminal on the back of the Display PCB.

6. Disconnect the Touch Panel ribbon cable connector from the back of the Display PCB.

7. Use a #1 Phillips screw driver to remove the screws that attach the Display PCB and the Vacuum Fluorescent Display (VFD) PCB to the Touch Panel stand offs.

8. Properly position the Display PCB and VFD PCB on the new Touch Panel and attach them to the stand offs.

9. Connect the ribbon cable connector from the Touch Panel to the Display PCB.

10. Connect and install the assembly in the pod.

11. Plug in the balancer and perform the appropriate functional checks.

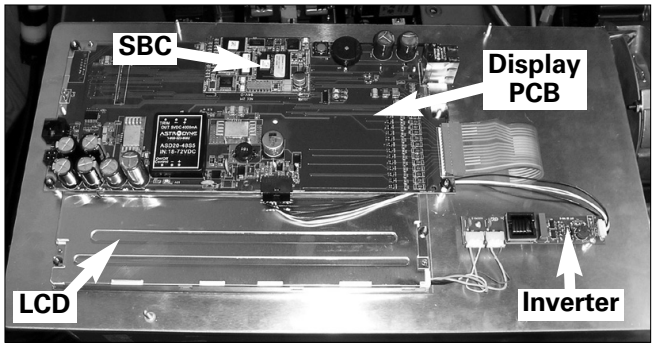
Touch Panel (3DV)

1. Unplug the balancer from the power source.

2. Remove the Touch Panel / Display Assembly from the Pod. (See appropriate replacement procedure in this manual.)

3. Remove the DC-AC Inverter. (See appropriate replacement procedure in this manual.)

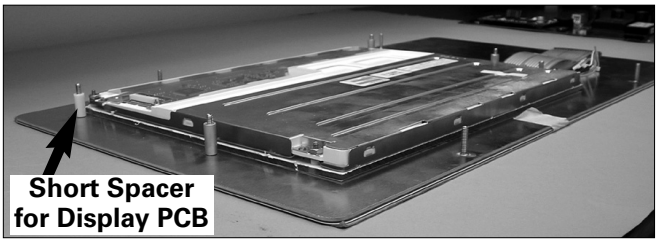
4. Remove the Single Board Computer PCB and the Display PCB as an assembly. (See appropriate replacement procedures in this manual.)



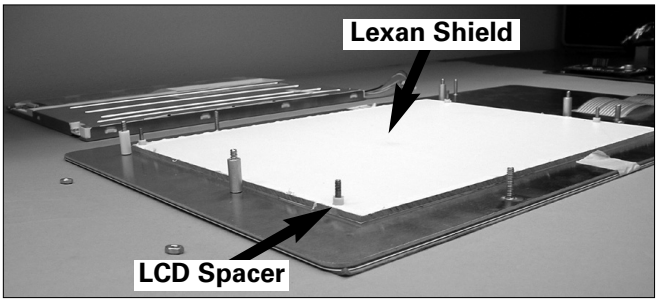
5. Remove the four spacers from the Touch Panel Display PCB stand offs. Note and mark the location of the short spacer. Remember that its location is critical for a reliable connection between the Display PCB and the LCD.

 Important: Always read and follow the information box instructions.

6. Remove the LCD. (See appropriate replacement procedures in this manual.)



7. Remove the four spacers from LCD stand offs.



8. Remove the Lexan shield.

9. Assemble in reverse order.

10. Perform a functional check.

Processor System

Main PCB

Note: Processor PCB revision H and backward will only drive 1250s. Revision I and forward will drive both 1250 and 1250 3DV.

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

4. Remove all of the cable/wire connectors from the Power PCB.

5. Remove the Processor PCB from its stand offs.

6. Install the new Processor PCB on the stand offs.

7. Connect all of the cable/wire connectors to the new Processor PCB. (Refer to the appropriate section of the "Wiring" section in this manual.)

8. Install the Processor PCB Cover.

9. Install the Weight Tray and Shield.

10. Plug in the balancer.

11. After replacing board, turn balancer on to pick up the model from the Display PCB, then reboot the balancer by shutting the balancer off, waiting about 5 seconds and then turning the balancer on.

12. Enter code "Shift 0" "72" to detect the hood sonar, if so equipped. Perform all calibrations necessary for model, i.e., 4-oz., laser, A&D arm, sonar. Perform the appropriate functional checks.

Display System

Display PCB (LEDs)

1. Unplug the balancer from the power source.

2. Use a #1 Phillips screw driver to remove the four screws and spacer bushings, if so equipped, on the back of the pod that retain the Touch Panel.

3. From the front of the pod, carefully pull out the Touch/Display Panel assembly.

4. Disconnect the 8 pin phone style connector cable on the back of the Display PCB. (See illustration in the "Reference Materials" section of this manual.)

5. Disconnect the green ground wire from its spade terminal on the back of the Display PCB.

6. Disconnect the Touch Panel ribbon cable connector from the back of the Display PCB.

7. Disconnect the Vacuum Fluorescent Display (VFD) PCB ribbon cable connector from the back of the Display PCB.

8. Use a #1 Phillips screw driver to remove the screws that attach the Display PCB to its Touch Panel stand offs.

9. Properly position the new Display PCB on the Touch Panel and attach them to the stand offs.

10. Connect the ribbon cable connector from the Touch Panel to the Display PCB.

11. Connect the ribbon cable connector from the VFD PCB to the Display PCB.

12. Connect and install the assembly in the pod.

13. Plug in the balancer and perform the appropriate functional checks.

Display PCB (3DV)

1. Unplug the balancer from the power source.

2. Remove the Touch Panel / Display Assembly from the Pod. (See appropriate replacement procedure in this manual.)

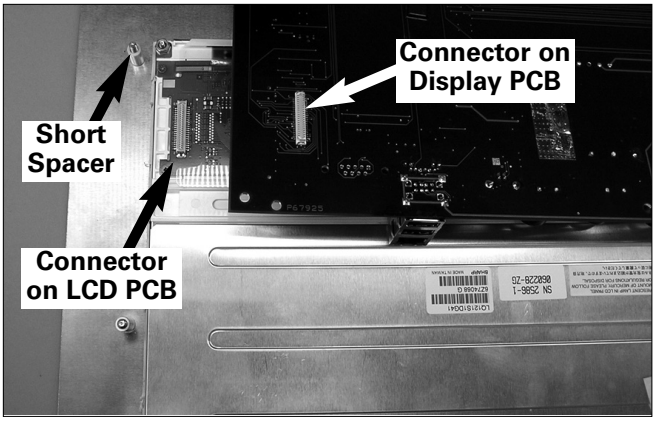
3. Note and mark the location and routing of the cables to the Display PCB.

4. Disconnect the cables to Display PCB.

5. Remove the "piggy back" Single Board Computer PCB from the Display PCB. (See appropriate replacement procedure in this manual.)

6. Remove the four nuts that attach the PCB to its standoffs.

7. Carefully disconnect the PCB from the direct connector on the back of the LCD.



8. Note the one shorter spacer on the standoff nearest the direct connector. This shorter spacer must NEVER be replaced with one of the longer ones as it helps insure a reliable connection between the Display PCB and LCD.

9. Install in reverse order.

10. Perform a functional check.

Vacuum Fluorescent Display

1. Unplug the balancer from the power source.

2. Use a #1 Phillips screw driver to remove the four screws and spacer bushings, if so equipped, on the back of the pod that retain the Touch Panel.

3. From the front of the pod, carefully pull out the Touch/Display Panel assembly.

4. Disconnect the 8 pin phone style connector cable on the back of the Display PCB. (See illustration in the "Reference Materials" section of this manual.)

5. Disconnect the green ground wire from its spade terminal on the back of the Display PCB.

6. Disconnect the Vacuum Fluorescent Display (VFD) PCB ribbon cable connector from the back of the VFD PCB.

7. Use a #1 Phillips screw driver to remove the screws that attach the VFD PCB to its Touch Panel stand offs

8. Properly position the new VFD PCB on the Touch Panel and attach it to its stand offs.

9. Connect the VFD PCB ribbon cable connector to the VFD PCB..

10. Connect and install the assembly in the pod.

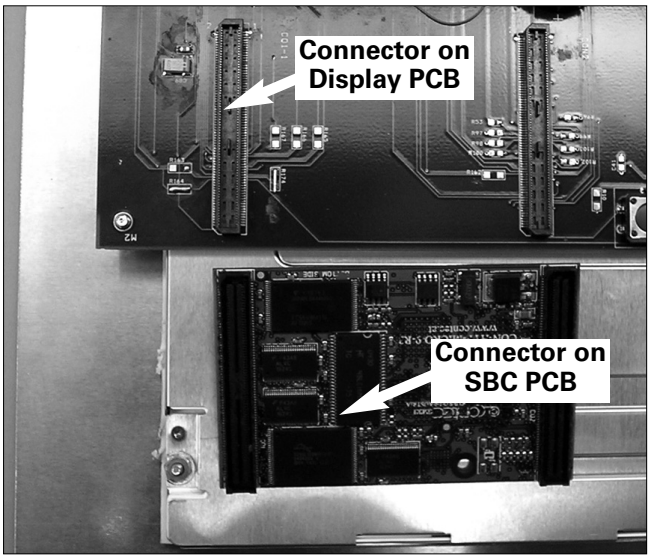
11. Plug in the balancer and perform the appropriate functional checks.

Single Board Computer SBC (3DV)

1. Unplug the balancer from the power source.

2. Remove the Touch Panel / Display Assembly from the Pod. (See appropriate replacement procedure in this manual.)

3. Carefully disconnect the Single Board Computer from the Display PCB. (It is a "piggy back" plug in component.)



4. Install in reverse order.

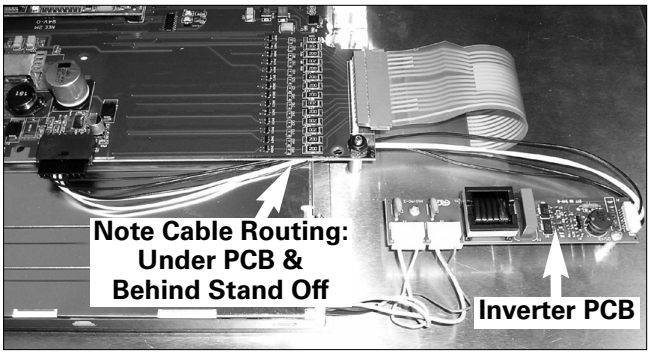
5. Perform a functional check.

DC-AC Inverter (3DV)

1. Unplug the balancer from the power source. Remember the inverter is the component that produces 3,000 Volts.

2. Remove the Touch Panel / Display Assembly from the Pod. (See appropriate replacement procedure in this manual.)

3. Note and mark location and routing of the cables to the inverter PCB. To avoid interference, it is critical that the 5 wire cable from the Inverter to the Display PCB be routed behind the display PCB standoff.



4. Remove the two Philips head screws that fasten the PCB to its standoffs.

5. Install in reverse order.

6. Perform a functional check.

 Important: Always read and follow the information box instructions.

LCD (3DV)

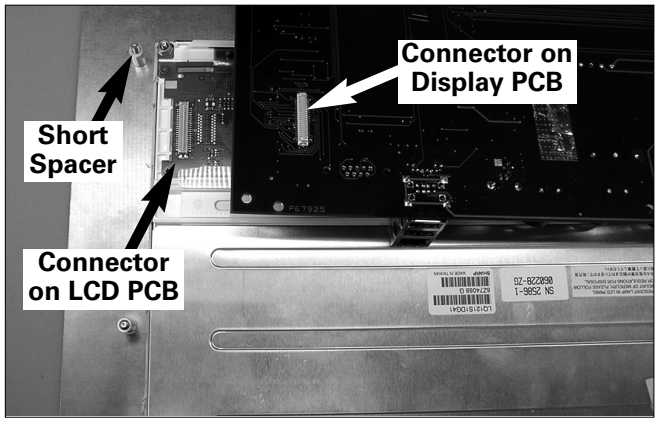
1. Unplug the balancer from the power source.

2. Remove the Touch Panel / Display Assembly from the Pod. (See appropriate replacement procedure in this manual.)

3. Remove the DC-AC Inverter. (See appropriate replacement procedure in this manual.)

4. Remove the Single Board Computer PCB and the Display PCB as an assembly. (See appropriate replacement procedures in this manual.)

5. Disconnect the cables to the LCD.



6. Remove the four nuts that retain the LCD to its stand offs. Remove the LCD.

7. Assemble in reverse order.

8. Perform a functional check.

Laser

⚠ CAUTION

Use of controls, adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

1. Unplug the balancer from the power source.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Remove the Processor PCB Cover. (See "Replacement Procedures" section of this manual.)

4. Unplug the laser cable connector from the Processor PCB. (See appropriate illustration in the "Wiring" section of this manual.)

Note: The routing of the laser cable and the tie down points for installation.

5. Remove the cable from the balancer chassis.

6. If removing the entire assembly, use a 1/4-inch Allen wrench to remove the 2 cap screws that hold the laser bracket to the front end bell of the motor.

7. If only replacing the cylindrical laser housing assembly, use a 1/8-inch Allen wrench to loosen the set screw in the housing assembly that retains the knob dowel.

8. Pull the knob and dowel from the housing.

9. Use a 3/16-inch Allen wrench to loosen the set screw in the bottom of the laser bracket enough to remove the housing. **Be careful to capture the 1/4-inch ball that the bottom of the housing pivots on and the plastic washer at the top** as you remove the laser housing from the bracket.

10. Back the bottom set screw down enough to hold the 1/4-inch ball in place and install the ball.

11. Install the laser housing and with the plastic washer on top **and the cable to the back side of the balancer**.

12. Install the knob and dowel.

13. Adjust the rotational force required to turn the laser housing as described in the "Adjustments" section of this manual.

14. Route the laser cable to the Processor PCB, with appropriate tie downs, and plug in the connector.

15. Install the Processor PCB Cover, Weight Tray Shield, and Weight Tray.

16. Plug in the balancer.

17. Perform a functional check on the laser and adjust the focus if necessary.

Battery On Line Laser

1. Use a flat blade screw driver inbetween the end of the laser and the plastic rod to help slide the line laser out of its housing.

2. Unscrew the end cap from the line laser.

3. Remove the two old button cell batteries.

4. Replace with two new 1.5 Volt LR44 (L1154) button cell batteries, negative pole inward, positive pole outward.

5. Install the end cap.

6. Slide the laser back into the housing. Be sure the on/off push button is oriented correctly in the open slot and that the laser beam aperture is pointing at the plastic rod in the bottom of the slot.

Line Laser Housing

1. Remove the Allen head screw that retains the housing to the arm.

2. Be sure to capture the tensioning spring under the head of the Allen screw.

3. When installing the housing, be sure that the tension on the retaining screw is sufficient to allow the housing to pivot but with some resistance.

Wheel Mounting & Drive System

Motor Assembly

Hennessy has a service motor kit for the 1250 Balancer. The kit will be a complete motor assembly: motor, 220V fan, optical encoder/rotary shutter. Refer to the Motor Service Kit instructions for additional information.

1. Unplug the balancer.

2. Remove A & D Arm from rod.

3. Remove weight tray, weight tray shield, motor cover, motor cover gasket, and motor cover shield.

4. Remove the laser assembly by removing the two 1/4-inch Allen screws that retain the laser bracket to the front of the motor.

5. Remove the four (4) 3/8 - 16 Nyloc spring retaining nuts, spring retainers and piezo springs.

6. Remove the two (2) 5/16 - 18 X1 washer head screws.

7. Disconnect the fan motor and optical encoder plugs.

8. Disconnect the motor wires from the power board PCB motor plug wires. (See illustration in the "Wiring" section of this manual.

9. Lift out the motor assembly.

10. Position the motor on its side or back and remove the four (4) 3/8 - 16 washer head screws holding the flex plate to the motor.

11. Remove the flex plate.

12. Remove the four (4) 3/8 - 16 washer head screws holding the cradle to the motor.

13. Remove the cradle from the motor.

14. Apply Loctite 242 to the threads of the 3/8 -16 washer head screws and install the cradle on the new motor.

15. Clean and apply Loctite to the surface of the flex plate and the cradle where they mate.

16. Apply Loctite 242 to the threads of the 3/8 - 16 washer head screws and install the flex plate on the cradle.

17. Ensure balls are inserted into each piezo assembly.

Note: Current piezos have the ball molded into the top casting

18. Install motor.

19. Install 5/16 - 18 X 1 washer head screws holding flex plate to chassis.

20. Install piezo springs, piezo retainers and 3/8 - 16 Nyloc nuts.

21. Tighten the Nyloc nuts until the distance from the top of the motor cradle to top of the piezo spring retainer is two (2) inches.

22. Connect fan motor plug.

23. Connect optical encoder plug.

24. Connect the motor wires to the wires coming from the motor connector on the Power PCB. (See illustration in "Wiring" section of this manual.)

25. Install motor cover shield, motor cover gasket, motor cover, weight tray shield, weight tray, and A & D arm.

26. Plug balancer in.

27. Perform Functional Checks and 4-ounce calibration.

28. Perform Functional Checks and a 4-ounce calibration.

Motor Fan

1. Unplug the balancer.

2. Remove weight tray and weight tray shield.

3. Disconnect fan motor plug.

4. Remove rear end bell cover.

5. Remove the two (2) 8-32 nuts holding the fan motor to the drive motor and remove the fan motor assembly.

6. Install new fan motor assembly and tighten nuts.

7. Install rear end bell cover

8. Connect fan motor plug.

9. Install weight tray and weight tray shield.

10. Plug in balancer.

11. Perform fan functional check.

Stub Shaft

1. Prevent the face plate from rotating by placing a large screw driver through one of the holes in the rim of the face plate.

2. Use a large adjustable wrench on the flats of the stub shaft to unscrew the shaft.

Note: On the 40mm version, the connecting threaded rod may come off with the stub shaft.

Chassis System

Weight Tray and Shield

1. Unplug the balancer.

2. Use a 3/8-inch wrench/socket to remove the four cap screws that retain the weight tray. (Two screws on each side of the balancer.)

3. Lift off the weight tray.

4. Use a 3/8–inch wrench/socket to remove the four cap screws that retain the weight tray shield. (Two screws on each side of the balancer.)

5. Lift off the weight tray shield.

6. Assemble in reverse order.

Processor PCB Cover

1. Unplug the balancer.

2. Remove the Weight Tray and Shield. (See "Replacement Procedures" section of this manual.)

3. Use a 3/8-inch wrench/socket to remove the four cap screws that retain the processor PCB Cover. (Two screws on top and two screw on bottom of cover.)

4. Lift off the cover.

5. Assemble in reverse order.

Safety Guard (Hood) Assembly

1. Unplug the balancer.

2. Remove the red end cap from the end of the safety guard (hood) bar at the rear of the balancer.

3. Use a medium flat blade screw driver and pry the retainer off by alternating from one side to the other.

4. Remove the flat washer.

5. Remove the white flanged bearing.

6. Note how the safety guard (hood) flange engages the hood switch assembly.

Note: The safety guard is fairly heavy and awkward to carry. Be careful when removing it and have a place ready to set it aside.

7. Pull the safety guard out of the bracket and set it aside.

See the "Installation & Set Up" section of this manual for installation. Perform a functional check after installation

Display Pod Assembly

1. Unplug the balancer from the power source.

2. Use a #1 Phillips screw driver to remove the four screws and spacer bushings (if so equipped), on the back of the pod that retain the Touch Panel.

3. From the front of the pod, carefully pull out the Touch/Display Panel assembly.

4. Disconnect the 8 pin phone style connector cable on the back of the Display PCB. (See illustration in the "Reference Materials" section of this manual.)

5. Disconnect the green ground wire from its spade terminal on the back of the Display PCB.

6. Set aside the Touch/Display Panel assembly.

7. Loosen the four 3/8 inch carriage bolts that secure the pod mounting brackets and pod to the pod support tube and slide the pod assembly off the tube.

8. Remove the rear harness cover from the chassis.

9. Pull the 8 pin phone connector cable and the green ground wire out of the bottom of the pod support tube.

10. Use a 3/8-inch wrench/socket to loosen the four Nyloc u-bolt nuts that retain the support tube to the chassis support bracket.

11. Lift the pod support tube out of the u-bolts and support bracket.

12. Slide the convoluted boot off of the tube.

13. Install in reverse order.

14. Plug in the balancer.

15. Perform the appropriate functional checks.

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